HISTORY OF
UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
Berkeley, California.

Prepared under Memorandum No. 348, dated November 13, 1918,
from the Office of the Director of Military Aeronautics,
Training Section, Ground Schools Branch.

By

First Lieutenant Gilbert M. Thomas.

Under the supervision of the following committee:

Major Charles B. Crane, Air Service, Aeronautics Commandant.
Dr. Baldwin M. Woods, President Academic Board.
First Lieutenant Gilbert M. Thomas, Air Service, Aeronautics.
Second Lieutenant Howard L. McLean, Air Service, Aeronautics.

Period of operation of School
From Monday, May 21, 1917, to Saturday, February 1, 1919.

Date of Completion of this History, March 1, 1919.

Vol. I

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Vol. 1

Plate No. 1 -- University of California Campus, looking across the Drill Field from the top of Hilgard Hall.

HISTORY OF
SCHOOL OF MILITARY AERONAUTICS
BERKELEY, CALIFORNIA.

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A. PLAN OF HISTORY

1. Authorization.

Memorandum No. 348 dated November 13, 1918, from the office of the Director of Military Aeronautics, Training Section, Ground Schools Branch, directed the Commandant of the School of Military Aeronautics to detail one officer to prepare a history of the School. This memorandum also directed the Commandant to appoint a committee on the preparation of the history of the School. The Commandant and President of the Academic Board were to be members of this committee and the committee was directed to furnish the officer detailed to prepare the history all possible assistance and to exercise supervision over the substance of the history.

2. Personnel Detailed to Prepare History.

Special Orders No. 139, Headquarters, United States Army School of Military Aeronautics, Berkeley, California, dated November 19, 1918, detailed First Lieutenant Gilbert M. Thomas to prepare the history as outlined in memorandum No. 348 and appointed the following committee to render assistance and exercise supervision over the substance of the history:

Major Charles B. Crane, Air Service, Aeronautics, Commandant.
Dr. Baldwin M. Woods, President Academic Board.
First Lieut. Gilbert M. Thomas, Air Service, Aeronautics.
Second Lieut. Howard L. McLean, Air Service, Aeronautics.

Major Crane was Commandant of the School of Military Aeronautics at the time of closing, andDr. Woods was President of the Academic Board as indicated by the titles above. Lieut. Thomas had served as Vice President of the Academic Board for some months, prior to that being head of the Aids to Flight Department and an instructor in the Observation Department. Lieut. McLean was Head of the Airplanes Department and in addition assisted materially in the administration, being Chairman of the Budget Committee and having direct supervision over the finances of the School.

3. Scope of History.

Quoting from Memorandum No. 348 - "The history of the School shall be complete on all essential points connected with the establishment of the School and its development. Particular attention should be paid to such matters as the curriculum, numbers, the status and previous experience of the instructors, the housing and physical equipment of the school, methods of instruction, administrative organization, organization of the instructional staff, arrangements for quarters and mess of cadets and of other enlisted personnel and for quarters for officers, interior organization of cadet corps for purposes of drill and discipline, and procedure and policies in disposing of cadets who have failed in studies

a. [illegible]

1. Authorization.

Memorandum No. 326 dated December 6, 1919, from the office of the Director of Military Aeronautics, Major General, Thomas Dickinson French, directed the Commandant of the School of Military Aeronautics to detail one officer to prepare a history of the school. This memorandum also directed the Commandant to appoint a committee on the preparation of the history of the School. The Commandant and President of the Academic Board were to be members of this committee and the committee was directed to furnish the officer detailed to prepare the history all possible assistance and to authorize inspection over the archives of the history.

2. Personnel Detailed to Prepare History.

Special Orders No. 140, Headquarters, United States Army School of Military Aeronautics, Dallas, Texas, dated September 12, 1919, detailed First Lieutenant Gilbert E. Moore to prepare the history as mentioned above. Gil and appointed the following committee to assist in accomplishing the work and supervision over the assistance of the Director Airplanes and exercise supervision over the assistance of the History:

Major Charles E. [illegible], Air Service, Aeronautics, Commandant.
Dr. Baldwin M. Woods, President Academic Board.
First Lieut. Gilbert E. Moore, Air Service, Aeronautics.
Second Lieut. Edward [illegible], Air Service, Aeronautics.

Major Moore was Commandant of the School of Military Aeronautics at the time of [illegible]. Woods was President of the Academic Board as indicated by the titles above. Lieut. Moore had served in this [illegible] of the Academic Board for some months, prior to their being [illegible] of the Flight Department and an instructor in the Observation Department. Lieut. Moore was head of the Airplanes Department and in practice. Lieut. [illegible] in the administration, being director of the [illegible] Budget Committee and having direct supervision over the finances of the School.

3. Scope of History.

According from Memorandum No. 326 - "The History of the School shall be complete on all essential points connected with the establishment of the School and its development. Surplusage selection should be paid to such matters as the curriculum, students, the status and previous experience of the instructors, the housing and physical equipment of the school, methods of instruction, administrative organization, organization of the instructional staff, arrangements for quarters and mess of cadets and of other enlisted personnel and for quarters for officers, interior organization of cadet corps (courses of drill and discipline, and procedure and policies in disposition of cadets who have failed to qualify

Plan of History.

or committed serious breaches of regulations. The problems that have arisen under the above heads or similar heads, the methods employed in meeting them, and the results obtained in each case should be clearly recorded. Changes and developments should be carefully noted. It is desired that this history should furnish a complete and lucid record of the experiences of the School in carrying out the general plan of giving ground instruction in schools of this type to candidates for commission as flying officers."

A report on the School covering in some detail all the items outlined in the above paragraph is bound to be rather voluminous and considerable care was exercised in the hopes of preventing it from becoming disconnected. In the attempt to exclude unnecessary detail it is hoped nothing essential has been omitted. Minute details on methods of instruction have not been included, but it is believed that the fairly complete general write-up on each department together with the syllabi on the various courses will prove all that is necessary.

Statistical data, syllabi, etc. which required several pages have been added as appendices rather than embodying them in the main report.

Illustrations of the various branches of the work of the School have been included where it was thought they would be helpful and certain charts and sketches which were considered of interest have been included.

The School opened Monday, May 21, 1917, and officially closed on Saturday, February 1, 1919, the last squadron graduating on the latter date. The history was concluded as rapidly as possible after February 1, 1918, hence does not contain complete financial data or complete data regarding final disposition of equipment.

4. Problems Met in Preparing History.

The records of an institution planned as hurriedly as this School was, and an institution which went through the rapid changes in size and curricula of instruction were apt to become somewhat confused. Obtaining accurate data on some points has necessitated searching carefully through masses of correspondence and telegrams. A fairly accurate and complete "log" of events has been maintained in the weekly reports of the Commandant and of the President of the Academic Board, but due to changes which took place on extremely

Plan of History.

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Plan of History.

short notice these reports were not always accurate,and often were not sufficiently definite and complete for the purposes of this history. There are no doubt a few discrepancies in figures and dates in this report but as much care and effort as time would permit have been spent in preparing statistical data and tables and it is believed that the records presented are very reliable.

5. General Outline.

The Table of Contents affords a very complete outline of the History but more briefly the scheme of preparation has been as follows:

A. Plan of History.
B. Introduction.
C. General Resumé .
D. Contracts.
E. Organization and Administration.
F. Curriculum.
G. Building for Instruction.
H. Equipment.
I. Instructors.
K. Instruction.
L. Cadet Corps (Including numerical data.)
M. Scholarship Records.
N. Financial Record.
O. University Policy.
P. Officers on Duty at School.
Q. Enlisted Men on Duty at School.
R. Medical Research Laboratory.
S. Adjutants School.
T. Inspect.of School.
U. Closing of School.

All of the above topics are of more or less interest and importance but more time has been devoted to Instructors and Instruction than any other divisions of the report, the latter topic including a fairly complete general write-up on each department of the School.

Sources of History.

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K. Instruction.
L. Cadet Corps (Including numerical data.)
M. [illegible] Records.
N. Financial [illegible].
O. [illegible] Life.
P. Officers on Duty at School.
Q. Enlisted Men on Duty at School.
R. [illegible]
S. Adjutants School.
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Plan of History.

The history includes, among other things, a copy of the contract between the University and the Government for the fiscal year 1918-19; an alphabetical list of instructors, by departments, who served with the School; giving certain data regarding status and previous experience of each man; copies of the principal curricula under which the School operated; an alphabetical list of graduates of the School and tabulated data showing total number of entrants, graduates and discharges by weeks throughout the entire period of operation; a chart showing the enrolled strength and graduates by weeks; a sample monthly financial report and a chart showing monthly receipts and expenditures; an interesting report on approximately 2100 students of this School showing the apparent effect of their previous education and occupation on their ability to complete the course; rosters of officers and enlisted men who served at the School with the period of service and duties.

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B. INTRODUCTION.

1. Ground Schools.

In carrying out its tremendous program of preparedness in the air one of the first steps of the War Department was the establishment of schools for giving ground training to the future military aviators. The men who were choosing to serve in this branch were coming from all walks of civilian life, from peaceful pursuits, and practically none of them had any idea of military life, and much less conception of the requirements of an aviator. It was essential that these men be given a short intensive ground training in military subjects, airplanes, engines etc., before attempting to learn to fly. The War Department recognized that the large universities of the country had the organization, buildings and could quickly assemble the teaching staffs to undertake this work with a minimum of delay, and certain of these institutions were called upon to organize Ground Schools for training military aviators.

No branch of the military service is free from hazard but to the ordinary mind military aviation appears particularly hazardous. For that reason it appealed to thousands of the best young men of the country, among the best in mental training and physical condition but entirely ignorant in the branches of military aviation and in most cases with no knowledge of military matters at all, but still willing and anxious to "take a chance" in this newest branch of modern warfare. In order that these men might benefit from the experience of others and start with the best training possible, the War Department decided to send representatives of the universities which were to undertake this work to Toronto to make a brief but careful study of the Canadian Ground School located there. This was done, and the American Ground Schools were originally patterned after the methods in use by the Royal Flying Corps, some changes in the course being made which were considered to make the course more thorough.

D. [illegible].

1. Ground Schools.

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Introduction.

In May, 1917, six GroundSchools started operations being located at the following institutions, University of California, Cornell University, University of Illinois, Massachusetts Institute of Technology, Ohio State University and the University of Texas. Shortly afterwards two additional Ground Schools were started, one at the Georgia Institute of Technology and one at Princeton University. As the output of the Ground Schools increased some of these institutions were eliminated or their energies devoted to preparing men for other branches of the Air Service besides pilots, but at no time have the results obtained from the Ground Schools as a whole been a disappointment to the War Department. How loyally the universities responded and how quickly they got into operation may be understood from the statement that within three months after the opening of the School, 2590 candidates had been sent to receive instruction, 876 had already been graduated and an average of 180 per week were being turned out at that time.

2. First Notice Received by the University of California.

As noted above the University of California was fortunate in being selected by the War Department as one of the institutions to conduct a Ground School. The following telegrams received on May 2, 1918, were the first official notices that such a selection had been made:

"Washington, D.C.
May 2nd, 1917.

Dean Barrows
University ofCalifornia
Berkeley, California
President Wheeler will wire out select three men for special service under orders War Department. Orders sent nearest Signal Office tosend you three blank forms oath. Have men execute oath and proceed immediately Toronto Canada. Report to Colonel C. G. Hoare Imperial Oils Buildings Church Street. Travel orders will be made out later to cover expenses. Colonel Hoare is advised regarding mission. Am sending letter explanatory.

W F DURAND"

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W F DURAND"

Introduction.

"Washington, D.C.
Dean David P Barrows May 2nd, 1917
Pres Office Berkeley Calif.

Send Woods and two other professors representing one Gas Engines and the other Physics to Toronto Canada, address C G Hoare R F C Imperial Oils Buildings for fortnights observation and instruction prior to teaching in our School of Aeronautics, one of six established by Government. Start immediately after taking oath. Blanks already sent you. Hope they start tomorrow. Government meets all expenses.

BENJ IDE WHEELER"

3. Personnel of Committee to Toronto:

The three following men, having taken the oath of allegiance, left Berkeley, Thursday, May 3rd, 1917 for Toronto:

Dr. B. M. Woods, Assistant Professor Theoretical Mechanics
Prof. B. F. Raber, Associate Professor Mechanical Engineering
Dr. L. T. Jones, Instructor in Physics.

4. Brief Summary of Trip to Toronto:

The representatives from the University ofCalifornia arrived in Toronto Monday, May 7th, 1917, getting in touch immediately with Professor Hiram Bingham ofYale University representing the War Department and with the representatives of the other Universities selected to conduct Ground Schools. These men organized as a Universities Commission with Professor Bingham as chairman, and committees wereappointed to investigate each branch of the work being given in the Toronto Ground School and make reports to theCommission. Four days were spent in careful study of the work being given in Toronto, the British officers stationed at the School offering every courtesy and assistance. A trip also was made to Camp Borden about 80 miles from Toronto where one of the Flying Schools was located. Thursday night, May 10th, 1917, the representatives from the University of California left Toronto to return to Berkeley.

Introduction.

Introduction.

The following suggestions and recommendations were made to the War Department by the Universities Commission:-

a. Curriculum Recommended: To consist of eight weeks intensive training, divided into three weeks preliminary military training and five weeks technical training, followed by final examinations. The curriculum adopted is discussed later in this report under theheading "Curriculum".

b. Method of Financing Recommended: Suggested that the institutions involved pay all expenses of conducting the schools and the Government allow a tuition fee of $50.00 per man. The plan of financing finally adopted is discussed later in the "Financial Record."

c. Date of Starting Classes and Size: Suggested that the War Department send 25 men per week to each institution beginning Monday, May 21st, 1917, which was done, the Schools starting operations on that date.

d. Equipment to be Furnished by theGovernment: A list of equipment covering such items as airplane engines, engine tools, engine accessories, airplanes, airplane instruments, bombs, machine guns, etc. , was submitted as material which should be furnished to each institution by the Government for instructional purposes.

5. Return of California Representatives:

The committee from the University of California returned to Berkeley, Wednesday, May 16th, 1917, and began immediate preparations for reception of the first squadron which arrived Monday, May 21st, 1917. An organization had to be developed, instructors obtained,equipment obtained, buildings erected for instructional purposes and arrangements made for housing and feeding the first squadron which was to arrive in less than one week. Dr. B. M. Woods was appointed by President Wheeler as the executive to represent the University, the title later assigned by the War Department to this office being, The President of the Academic Board. Prof. B. F. Raber, took charge of preparations for the Engine Department and Dr. L. T. Jones for the Gunnery Department, all three men cooperating in making other arrangements for opening the School.

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a. Curriculum Recommended: To consist of eight weeks intensive training, divided into three weeks preliminary military training and five weeks technical training, followed by final examinations. The curriculum adopted is discussed later in this report under the heading "Curriculum".

b. Plan of Financing Recommended: It was noted that the institutions involved pay all expenses of conducting the schools and the Government allow a tuition fee of $40.00 per man. The plan of financing finally adopted is discussed later in the "Financial Record."

c. Date of Starting Classes and Size: It was noted that the War Department sent 15 men per week to each institution beginning Monday, May 21st, 1917, which was done, the Schools starting operations on that date.

d. Equipment to be Furnished by theGovernment: A list of equipment covering such items as airplane engines, engine tools, engine accessories, airplanes, airplane instruments, bombs, machine guns, etc., was submitted as material which would be furnished to each institution by the Government for instructional purposes.

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The committee from the University of California returned to Berkeley, Wednesday, May 16th, 1917, and began immediate preparations for reception of the first contingent which arrived Monday, May 21st, 1917. An organization had to be developed, instructors obtained, equipment obtained, buildings erected for instructional purposes and arrangements made for boarding and feeding the first contingent which was to arrive in less than one week. Dr. B. M. Davis was appointed by President Wheeler as the executive to represent the University, the title later assigned by the War Department to this office being, the President of the Academic Board. Prof. E. F. Baker, took charge of preparations for the Engine Department and Dr. L. T. Jones for the Gunnery Department, all three now cooperating in making other arrangements for opening the School.

C -- GENERAL RESUME

I. PURPOSE OF SCHOOL.

When the War Department decided to follow the general plan of the British Government in the establishment of Ground Schools, as noted previously in this report several Universities in this country were designated to operate these schools for the Government. The Ground Schools were originally established to give ground training for pilots. As aerial warfare became more complicated and more developed, certain of the schools in the United States were changed in order to give instruction for bombers and observers. The School at the University of California was established to give ground training for pilots and has continued in this branch of the work throughout its entire course. The last curriculum under which the School operated provided a course for bombers and observers in addition to the regular course for pilots, but due to the signing of the armistice, these courses were never actually put into effect.

2. TYPE OF MAN DESIRED.

It has always been the plan of the War Department that the American Military Pilot should be an officer in the army, his responsibilities and qualifications necessarily then, being those of an officer. His training by the time he reached the front and the cost of the machine in which he would fly would probably cost the Government $25,000.00 and as a question of pure economy, the War Department did not desire to spend that much money on training any except officer material. The original requirements for admission to the Ground Schools were somewhat higher than at the close of the School. Formerly, three years college training or its equivalent were required. Later, the educational requirement was changed and high school training only was necessary and in some cases this was waived. In addition to the educational requirements, extremely rigid physical examinations covering eye sight, hearing, lungs heart and nerves, and special tests to determine if the candidate had a proper sense of balance, were given. Judgement, character, and tenacity of purpose were also qualities carefully considered by the examining board in so far as this board was able to pass upon them. Men who were good in athletics, in fact who were leaders in the various branches of sports were considered especially good candidates. Above all, the candidate was required to possess the proper material for developing into an officer of the United States Army.

3. GENERAL PLAN OF OPERATION.

The Ground Schools have been conducted by the Universities where they were located under contract for the United States Government. The contract provided that the Universities would furnish all necessary buildings and equipment except equipment of a special nature, such as airplanes, motors, machine guns, etc; would furnish the necessary instructors and other facilities necessary for the proper operation of the School. In return, the Government agreed to pay a specified tuition for each man

receiving instruction, and also furnish equipment of a special character not easily procurable by the University, the curriculum of instruction to be followed and such special information of instructional character as could be secured by the War Department from time to time.

The chief authority at the Ground Schools was the Commandant, who was the direct representative of the Director of Military Aeronautics. He was responsible for the successful operation of the School, including both military and academic. The representative of the University who was in more or less direct charge of the instructional work was the President of the Academic Board. Under the subject of Organization and Administration, the officials who served in the above capacities at this institution are named. On the following sheet is included a map of the campus of the University of California on which have been located various buildings, drill grounds and other facilities used by the School. This is included in order to give an idea of the relative positions of the various buildings used by the School of Military Aeronautics.

4. SOME BRIEF STATEMENTS REGARDING,

a. Period of Operation: The School opened on Monday, May 21, 1917, and closed Saturday, February 1, 1919, the last squadron graduating on the latter date. The total period of operation amounted to eighty-nine weeks, which includes two vacations periods of two weeks each, or a net period during which the School operated of eighty-five weeks.

b. Curriculum: The School operated under an eight weeks' curriculum from the date of opening, on May 21, 1917, until March 11, 1918. The twelve weeks' course was started on the latter date, but squadrons graduating for the seven weeks following that date of course graduated under the former eight weeks' course. The curricula were revised frequently, but the School operated for the greater part of the time under the curricula of the following dates:

June 11, 1917 (eight weeks' course)
November 1, 1917 (eight weeks' course)
April 1, 1918 (twelve weeks' course)
October 11, 1918 (twelve weeks' course)

One thousand, five hundred and fourteen men graduated from this School under the eight weeks' curriculum, one thousand two hundred and ten graduated under the twelve weeks' curriculum, and the remainder, three hundred and eight, graduated under a shorter course varying from eight to twelve weeks.

c. Instructors: A total of one hundred and forty-five instructors have served in this School, exclusive of administrative officers, officers in charge of the barracks, and instructors for calisthenics and sports. The maximum size of the staff at any one time, exclusive of the instructors noted above, was eighty-seven. The men omitted above, who were not directly included in the instructional staff, would probably total from fifteen to twenty. Of the total number of instructors, fifty per cent were University graduates. The average length of service of instructors was 7.7 months.

d. Numbers: The total number entering the School was three thousand,

receiving instruction, and also furnish equipment of a social character not so procurable by the University, the curriculum of instruction to be followed and special attention of instructional character as could be secured by the War Department from time to time.

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c. Period of operation: The School opened on Monday, May 21, 1917, and closed Saturday, February 1, 1919, the last aviation graduating on the [illegible]. The total period of operation amounted to eighty-nine weeks, which included [illegible] operations periods of two weeks each, or a net period during which the School operated [illegible].

[illegible] School operated under an eight weeks' curriculum [illegible] but aviations graduating for the seven weeks [illegible] graduated under the former eight weeks' course. The curriculum [illegible] but the School operated for the greater part of the [illegible] of the following dates:

[illegible] 21, 1917 (eight weeks' courses)
[illegible]
[illegible]
[illegible]
[illegible]
[illegible] a shorter course varying from eight to twelve weeks.

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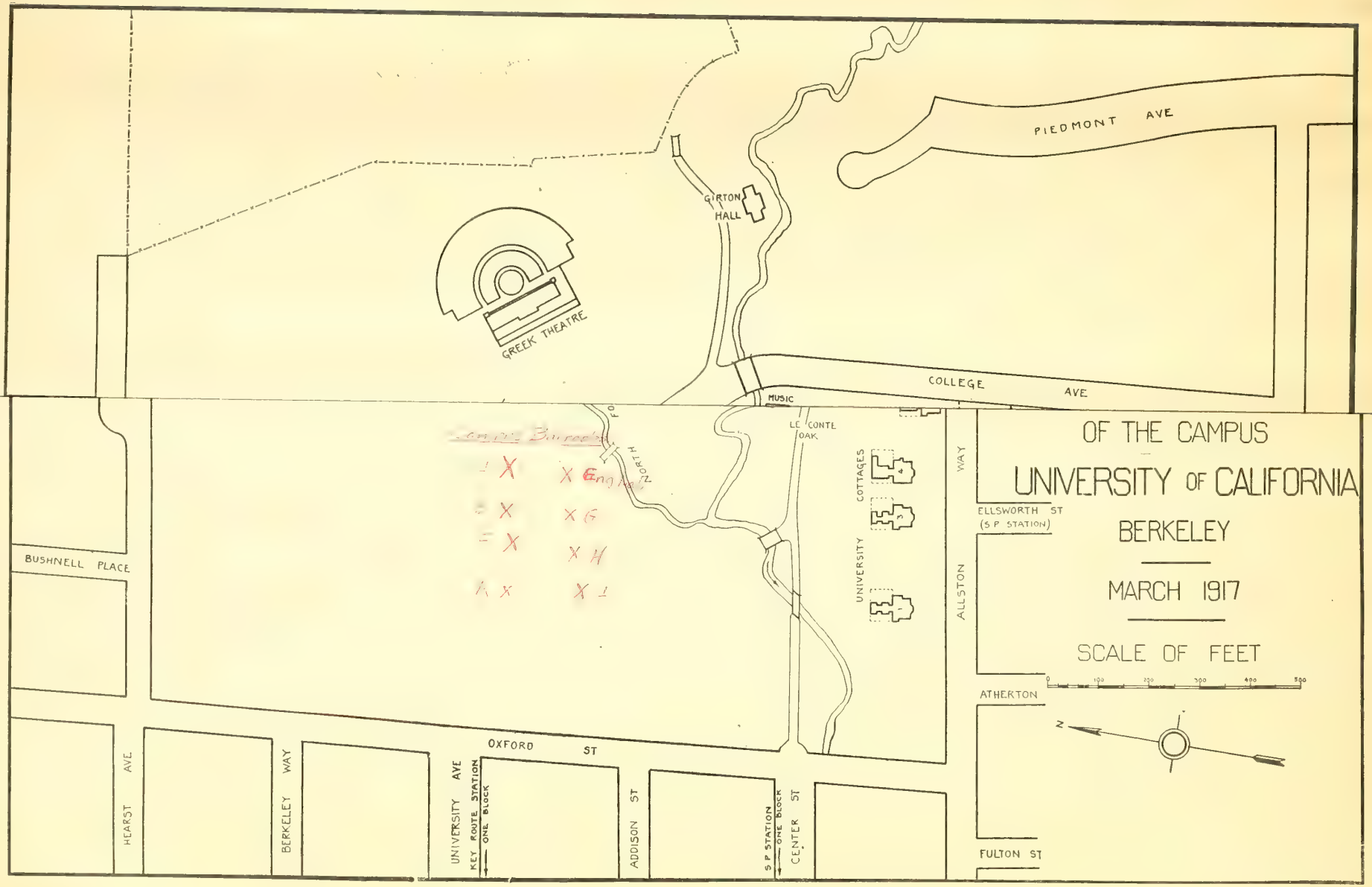
e. Numbers: The total number entering the School was three thousand,


OF THE CAMPUS
UNIVERSITY OF CALIFORNIA
BERKELEY
MARCH 1917
SCALE OF FEET
0 100 200 300 400 500
N
PIEDMONT AVE
GIRTON HALL
GREEK THEATRE
COLLEGE AVE
MUSIC
LE CONTE
OAK
COTTAGES
UNIVERSITY
NORTH
BUSHNELL PLACE
ELLSWORTH ST
(S P STATION)
ALLSTON WAY
ATHERTON
FULTON ST
OXFORD ST
HEARST AVE
BERKELEY WAY
UNIVERSITY AVE
KEY ROUTE STATION
ONE BLOCK
ADDISON ST
S P STATION
ONE BLOCK
CENTER ST


MAP
OF THE CAMPUS
UNIVERSITY OF CALIFORNIA
BERKELEY
MARCH 1917
SCALE OF FEET
PIEDMONT AVE
COLLEGE AVE
GREEK THEATRE
CHEMISTRY BUILDING
GILMAN HALL
HEARST MEMORIAL MINING BUILDING
HEARST CIRCLE
MECHANICS BUILDING
ASUC COOPERATIVE STORE
ODE UNIVERSITY LIBRARY
BENJAMIN IDE WHEELER HALL
CALIFORNIA HALL
BOALT HALL
BACON HALL
SATHER TOWER
INFIRMARY
TENNIS COURTS
CALIFORNIA FIELD
RUNNING TRACK
MUSEUM OF ZOOLOGY
BRIDGE
BASEBALL FIELD AND DRILL GROUNDS
FLAG POLE
FOOTBALL STATUE
PRESIDENT'S RESIDENCE
STUDENTS' OBSERVATORY
MILLARD HALL
AGRICULTURE HALL
ENTOMOLOGY
HOT HOUSES
STILES HALL
X Brick Barracks
X C. Barracks (& Mess.)
LE CONTE GAP
COTTAGES
UNIVERSITY
STRAWBERRY CREEK
HIGHLAND
LA LOMA
NEWMAN HALL ONE BLOCK
FOUNDERS' ROCK
TOPEFSTRY
PHILOSOPHY
DRAWING
HOME ECONOMICS
ARCHITECTURE
EUCLID
SCENIC
LE CONTE
ARCH
BUSHNELL PLACE
HEARST AVE
BERKELEY WAY
UNIVERSITY AVE
ADDISON ST
CENTER ST
OXFORD ST
FULTON ST
ATHERTON
ELLSWORTH ST
CHAPEL ST
DANA ST
UNION ST
TELEGRAPH AVE
BANCROFT WAY
BOWDITCH
COLLEGE
KEY ROUTE STATION

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Anatomy Building.—Gift of Mrs. Phoebe A. Hearst. A temporary wooden building erected originally as shops for the Department of Mining, in the rear of the Civil Engineering Building.

Architecture Building.—At Euclid avenue entrance. Erected 1906. Enlarged 1912. Cost $24,000.

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1905 Bench.—South of Football Statue. Dedicated 1910 to President Benj. Ide Wheeler by the class of 1905.

Boalt Hall of Law.—South of California Hall. Completed 1911. Cost $190,000, of which $100,000 is the gift of Mrs. Elizabeth Josselyn Boalt as a memorial to Judge Boalt, while $50,000 was subscribed by the lawyers of California. Class rooms, offices, and library of the School of Jurisprudence.

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Chemistry Building, Auditorium, and Annex.—East of East Hall. Erected 1891, enlarged 1912 (Auditorium), 1913 (Annex), and 1914 (Annex). Valued at $136,700. (See Gilman Hall.)

Civil Engineering Building.—Northeast of Bacon Hall. Erected 1879. Valued at $38,500.

Civil Engineering Testing Laboratory.—East of Civil Engineering Building. Erected 1910. Enlarged 1911. Cost $11,800.

Conservatory.—North of new University Library Building. Erected about 1891. Valued at $11,000.

Drawing Building.—~~East of Architecture Building. Erected 1914. Cost~~ $21,500.

East Hall.—East of Bacon Hall. Erected 1898. Wooden building, valued at $18,000, used by the Department of Zoology.

Entomology Building. Adjoining Harmon Gymnasium, near Sather Gate. A small wooden building, housing the State Food and Drug Laboratory.

Faculty Club.—On Strawberry Creek. Erected 1903, enlarged 1914, by the members of the Club. Original cost $12,000.

Fertilizer Control Laboratory.—North of California Field. Erected 1908. Enlarged 1910 and 1914. Cost $14,000.

Football Statue.—Among the oaks west of California Hall. Made by Douglass Tilden. Gift of Senator James D. Phelan in 1900 as a trophy of football victories in 1898 and 1899.

1914 Fountain.—Southwest of South Hall. Erected 1914 by the class of 1914. Cost $600.

Gilman Hall. A three-story concrete building, contains the departmental library and administrative offices and laboratories for advanced work in physical chemistry, electro-chemistry, and chemical technology. Completed in 1917 at a cost of $197,179.

Girton Hall.—South of Greek Theatre. Erected 1911 by Associated Women Students. Cost $4000.

Greek Theatre.—At the foot of the slope of Charter Hill. Erected 1903. Valued at $45,000. The gift of William Randolph Hearst. The center of the musical and dramatic activities of the University, the scene of student rallies and the place of assembly for University ceremonies, as on Charter Day and Commencement. Seating capacity as follows:

Chair section	2,000
Stone seats—diazoma wall	154
Stone seats above the diazoma	4,400
Stage seating—maximum	600
	7,154
By utilizing the aisles and the space in the rear of stone seats it is possible to accommodate	1,400
making the total capacity of the Theatre	8,554

It is estimated that upon several occasions the Greek Theatre has accommodated more than 10,000 persons.

Harmon Gymnasium.—On South Drive near Sather Gate. Erected 1878. Valued at $50,000. Original building the gift of Mr. A. K. P. Harmon, but since much enlarged. Used for gymnasium work of the men students, and also for the fortnightly University Meetings, student dances, and other gatherings.

Hearst Fountain.—In front of Hearst Memorial Mining Building. Constructed 1913. Cost $16,000.

Hearst Hall.—On College avenue. Erected 1900. Enlarged 1914. Valued at $36,000, the gift of Mrs. Phoebe A. Hearst. Used as a women's gymnasium, and also as a social center for the women students; is frequently used as a lecture or concert hall.

Hearst Memorial Mining Building.—Completed 1907. Cost $645,000, the gift of Mrs. Phoebe A. Hearst, as a memorial to her husband, Senator George Hearst. Described by President Wheeler as "not only the largest but the most completely equipped building devoted exclusively to the study of mining engineering in the world."

Hilgard Hall.—Completed in August, 1917. The gift of the people of California, the funds for its erection being appropriated by the Regents from the $1,800,000 bond issue provided by the initiative vote of the people in 1914. Cost $350,000 and contains equipment to the value of $25,000 additional. Comprises the second of the three buildings which will complete the agricultural quadrangle. Houses the divisions of forestry, agronomy, citriculture, genetics, zymology, and pomology.

Home Economics Building.—North of the Mechanics Building. A wooden structure, completed in June, 1916, at a cost of $17,500.

Hygiene and Pathology Laboratory.—Erected 1909, enlarged 1913. Near Physiological Laboratory and Hearst Hall. Cost $40,000. Besides the University departments, the State Hygienic Laboratory is in this building.

Mechanics Building.—Near North entrance. Erected 1892. Valued at $61,000. Substantially constructed of brick, but built before the adoption of the Hearst permanent plan.

Museum of Greek Sculpture and Anthropology.—South of Faculty Club. A temporary building, gift of Mrs. Phoebe A. Hearst, containing a collection of casts and classical sculpture and the offices in Berkeley of the Department of Anthropology.

Newman Hall.—Ridge road and La Loma avenue. Built in 1910. Cost about $100,000, the gift of several friends. Not a University building, but the headquarters of the Newman Club, the organization of the Catholic men and women of the University.

North Hall. Erected in 1873. The second building to be erected on the campus. A structure of wood. The first Commencement exercises on the Berkeley Campus were held in this building while still uncompleted on July 16, 1873. Razed in April, 1918. The basement, still remaining, is the headquarters of various student publications and other enterprises, and houses the Associated Students' Store.

Philosophy Building.—North of the Mining Building. Moved from its original location on North Drive near the Civil Engineering Building in 1916. Erected in 1898. Valued at $8000.

Power House.—Southwest of Budd Hall. Cost, including equipment, $150,000. Supplies light, heat, and power for the University buildings. Connected with Boalt Hall, California Hall, the University Library, Hilgard Hall, and Gilman Hall, by tunnels, and with other buildings by conduits for pipes and wires.

President's House.—North side of campus, on Hearst avenue at Scenic. Completed 1911. Cost, including equipment, $125,000. The residence of the President of the University.

Printing Office.—On Bancroft way, east of Telegraph avenue and west of the Cinder Path. A concrete building, completed in December, 1916. Cost, including equipment, approximately $60,000.

Sather Tower.—West of Bacon Hall. Constructed in 1914 from funds provided in the will of the late Mrs. Jane K. Sather. Cost $200,000 and $25,000 for Sather Bells. The twelve bells were manufactured in England and arrived in Berkeley in 1917 after having safely traversed the submarine zone. They were placed beneath the steel ceiling of the belfry, 198 feet from the ground and 102 feet below the spire.

Sather Gate.—At Telegraph avenue entrance. Erected 1909. Cost, with the bridge and roadway, $50,000, of which $40,000 was the gift of Mrs. Jane K. Sather, while the University built the bridge and road.

Senior Hall.—On Strawberry Creek near Faculty Club. Erected 1906. Enlarged 1914. Valued at $4600, the gift of the Order of the Golden Bear, a students' society. It is built entirely of redwood logs in the rough, and is the headquarters for the men of the senior class.

South Hall.—Erected 1873, enlarged 1913. Valued at $131,000. The first building erected on the campus. A substantial structure of brick; has no place in the permanent plan, but is likely to serve for a half-century or more. Now used by the Department of Physics.

Spreckels Physiological Laboratory.—Northeast of California Field. Erected 1903 at a cost of $25,000. Gift of Mr. Rudolph Spreckels.

Stiles Hall.—Gift of Mrs. Anna J. Stiles. Corner of Allston way and Dana street. Not a University building, but the home of the Y. M. C. A. and Y. W. C. A. of the University. Now occupied by the flying cadets of the School of Military Aeronautics.

Students' Infirmary.—College avenue. Opened 1907. Enlarged 1912, 1913, 1914. Cost, with additions, $25,000. Hospital and dispensary for all students of the University, conducted by the University under the direction of the University Physician; supported by a student fee of $6 per annum.

Students' Observatory.—North of Conservatory. Valued at $8500. Used by the Department of Astronomy.

Sun Dial.—South of Sather Tower. Gift of the class of 1877.

Swimming Pool (for men).—In Strawberry Cañon. Completed April, 1911. Cost about $20,000, including bath-house and equipment, and paid for by students' fees. Length 232 feet, width 76 feet, depth 3½ to 11 feet, contents about 550,000 gallons. Water purified by filter beds farther upstream.

Swimming Pool (for women).—North of Hearst Hall. Constructed 1914. Cost $6700.

Tennis Courts.—College avenue, south of Hearst Hall. Constructed 1914–15. Cost $23,000.

Track.—West of California Field. Constructed 1914–15. Cost $40,000.

University Library.—Cornerstone laid Thanksgiving Day, 1908. Partially completed and occupied in the fall of 1911. Entirely completed in December, 1917. Cost, including furnishings, $1,442,339.41, of which $730,000 was bequeathed by Charles Franklin Doe. The number of volumes is approximately 375,000.

Storehouse.—Adjoining the Printing Office on the north. A concrete building, completed in June, 1917, at a cost of $10,280.

Benjamin Ide Wheeler Hall, built of granite at a cost of $700,000, was the first building to be completed out of the bond issue of $1,800,000 generously voted by the people of the State. Contains sixty-two classrooms, seating 4899 persons, including the large central lecture hall, seating 1050 people.

BERKELEY, September, 1918.

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seven and forty-one, of whom three thousand and thirty-two graduated, the others being relieved from instruction for Various reasons. Neglecting the period after the signing of the armistice, the number of men discharged amounted to 15.2% of the total number entering the School. The largest entering squadron was eighty-seven. The largest squadron to receive instruction, however, was one hundred and sixty three cadets, this number being caused by the addition of the men sent out to this School from the Ground School at Ohio State University. This large squadron was later subdivided, however, and operated as a unit for a few weeks only. The largest squadron to graduate contained ninety-five cadets. The largest active weekly strength of the School was nine hundred and forty cadets, in July of 1918. The School has graduated a squadron every week from Saturday, July 14, 1917, (date of graduation of the first squadron), to Saturday, February 1, 1917, with the exception of the two Christmas vacations of two weeks each, the size of the graduating squadrons varying from eleven to ninety-five cadets.

e. Finances: The total cost of operation has been slightly in excess of three hundred thousand dollars, within which the largest item is that of instruction, approximating one hundred and eighteen thousand dollars. The original cost of buildings have been between seventy and seventy five thousand dollars. The above figures on finances are more or less approximate in as much as the final figures were not available at the time this report was completed.

D. CONTRACT

1. GENERAL DESCRIPTION

The University of California conducted the School of Military Aeronautics for the United Stated Government under a contract specifying the conditions under which the work was to be done, character of instruction and the tuition to be paid by the Government to the University. For several weeks after the school opened the method of financing remained undetermined and no contract was drawn up. This left the University in considerable doubt as to what funds would be available for the purpose of getting the school under way.

In all, three contracts were executed in connection with the operation of the school. The first covered the period from May 21, 1917 to June 30, 1917 and the second from July 1, 1917 to June 30, 1918, these two contracts being exactly similar except for the period of operation. The third contract covered a period from July 1, 1918 to June 30, 1919. The provisions regarding the character of instruction to be given, equipment to be provided and tuition to be paid are the same in all contracts, the only difference being that the contract for the fiscal year 1918-19 has a provision that any net deficit existing at the close of the school shall be made good by the Government. The net deficit is defined as the difference between all proper expenditures and the total receipts from tuition less the salvage value of any equipment purchased by the University for the school. The original contract for the year 1917-18 provided that tuition would be paid at the rate of $10.00 per week for instruction given each man for the first four weeks and $5.00 per week thereafter, except that in no case was the total tuition received for any one man to be greater than $65.00. When the length of the course was increased from eight to twelve weeks this proviso limiting the tuition charge to $65.00 was eliminated and a charge of $5.00 per week was made for each man for all weeks of instruction received above the first four weeks.

2. COPY OF LAST CONTRACT

A copy of the contract for the fiscal year 1918-19 is furnished in the following pages. This contract is similar in all respects to the contracts for the prior periods of operation with the exception of the clause providing that the University shall be reimbursed for any net deficit existing at the close of the school.

Copy of Contract

"THESE ARTICLES OF AGREEMENT, entered into this fifth day of September 1918, between Colonel C. G. Edgar, Air Service Aeronautics, Chief of Supply Section, Division of Military Aeronautics, for and in behalf of the United States of America, Party of the First Part, and the Regents of the University of California, in the County of Alameda, State of California, (hereinafter designated as the contractor), Party of the Second Part, witnesseth: That the said parties do covenant and agree, to and with each other, as follows, viz:

1. [illegible]

The University of California conducted the School of Military Aeronautics for the United States Government under a contract specifying the conditions under which the work was to be done, conducted by instructors and the citizens to be paid by the Government to the University. For several months after the School opened the method of financial receipts remained undetermined and no receipts were made up. This fact the University in consideration added to a more firm basis to be available for the purpose of meeting the general needs thereof.

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4. COPY OF LAST CONTRACT

A copy of the contract for the fiscal year 1918-19 is furnished in the following pages. This contract is similar in all respects to the contracts for the prior periods of contracts with the exception of the clause providing that the University shall be responsible for any net deficit existing at the close of the school.

Copy of Contract

"THESE ARTICLES OF AGREEMENT, entered into this fifth day of September 1918, between Colonel C. G. Edgar, Air Service Aeronautics, Chief of Supply Section, Division of Military Aeronautics, for and in behalf of the United States of America, party of the first part, and the Regents of the University of California, in the County of Alameda, State of California, (hereinafter designated as the contractor), party of the second part, witnesseth: That the said parties in consideration the sums and the [illegible] as follows, viz:

Contract.

ARTICLE 1. The contractor shall provide, properly equip and maintain, at the University of California, Berkeley, California, a school of military aeronautics of sufficient size to enable the adequate ground training thereat of at least two hundred (200) students at a time.

ARTICLE II. The contractor shall provide at the school a sufficient number of competent instructors to give lectures, demonstrations, and other instruction in the following subjects: "Military Subjects", "Airplanes", "Engines", "Gunnery", "Observation", "Signalling", and such other subjects as may be designated by the Director of Military Aeronautics.

ARTICLE III. The contractor shall, during the period commencing July 1, 1918, and ending June 30, 1919, give ground training in the subjects mentioned in Article II to officers and enlisted men of the United States Army, designated for such training by the Director of Military Aeronautics, in accordance with such regulations relating to the schedule of training and instruction as may be issued by the Director of Military Aeronautics from time to time.

ARTICLE IV. That for and in consideration of the faithful performance of the stipulations of this contract, the contractor shall be paid at the office of the Commandant of the School of Aeronautics, University of California, for all services rendered in conformity with the requirements of this contract, compensation as follows, for each student instructed in behalf of the United States Army: Ten Dollars ($10.00) per week for each of the first four (4) weeks instruction and Five Dollars ($5.00) for each additional week of instruction.

For each student found unsatisfactory, or relieved from instruction for any reason before the completion of the course, payment shall be made at the rates above specified, for the number of weeks instruction actually rendered, up to and including the last day of his receiving instruction in said school.

If the expenditures reasonably incurred by the Contractor in carrying out the terms of this agreement shall exceed the compensation earned, the contractor shall, at the discontinuance of said school, be paid in addition to the compensation earned by said school under this agreement a sum equal to the difference between that amount and any actual expenditures reasonably incurred by the contractor on behalf of said school over and above said compensation, less the reasonable net value to the contractor of any improvements or equipment installed for the school. The term "Reasonable net value of improvements or equipment" is construed to mean the net value which such improvements or equipment will be to the University of California after said school has been discontinued at said University.

In the event that the parties are unable to agree upon what shall constitute expenditures reasonably incurred, or reasonable net value of said above mentioned equipment as stated above, said expenditures or said net value of

conditions.

ARTICLE I. The contractor shall provide, properly equip and maintain, at the University of California, Berkeley, California, a school or military academy of sufficient size to satisfy the demands growing out of the training and instruction of a thousand (1000) students at a time.

ARTICLE II. The contractor shall provide at the school a sufficient number of competent instructors to give lectures, demonstrations, and other instruction in the following subjects: "Military Tactics", "Engineering", "Gunnery", "Observation", "Signaling", and such other subjects as may be designated by the Director of Military Science.

ARTICLE III. The contractor shall, during the period commencing July 1, 1942, and ending June 30, 1943, give proper training in the subjects mentioned in Article II to officers and enlisted men of the United States Army, designated for such training by the Director of Military Science, in accordance with such regulations relating to the manner of training and instruction as may be issued by the Director of Military Science from time to time.

ARTICLE IV. Pay for such in consideration of the satisfactory performance of the obligations of this contract, the contractor shall be paid by the Office of the Quartermaster of the Army of Washington, Washington, Oregon or California, the sum of ten dollars ($10.00) per week for each of the first four (4) weeks instruction and five dollars ($5.00) for each additional week of instruction.

For each student found unsatisfactory, or relieved from instruction the day season before the completion of the course, payment shall be made at the above specified, for the number of weeks instruction actually received, up to and including the last day of his receiving instruction in said school.

If the expenditures reasonably incurred by the Contractor in carrying out the terms of this Agreement shall exceed the compensation herein, the Contractor shall, at the discretion of said School, be paid in addition to the compensation above provided by said School under this Agreement an amount equal to the difference between such actual and other expenditures reasonably incurred by the contractor on behalf of said School and the compensation, less the reasonable net value to the contractor of any improvements or equipment installed for the School. The term "reasonable net value of improvements or equipment" as used herein means the net value with such improvements or equipment will be to the University of California after such School has been discontinued at said University.

In the event that the parties are unable to agree upon such net shall contribute expenditures reasonably incurred, or reasonable net value of said above installations, equipment as stated above, said expenditures or said net value of

improvements or equipment to the University of California shall be determined by the decision of an arbitration committee appointed for the purpose of so determining these matters. Each of the parties of this agreement shall appoint one member of said arbitration committee and two members so appointed shall agree upon a third member. In so far as the determination of the reasonable expenditures incurred and the net value of said equipment are concerned, the parties hereto further agree to abide by and consider as final, all decisions rendered by any two of the three members of said arbitration committee.

ARTICLE V. The contractor shall at all times cooperate to the best of his ability with the officer of the United States Army detailed as commandant at the school, and shall endeavor to fulfill the above stipulations in a manner best calculated to coincide with the wishes of the Director of Military Aeronautics.

ARTICLE VI. The contractor shall permit representatives of the United States to be present at the school at any and all times to witness or supervise instruction and work, to inspect and examine all equipment, to pass upon its fitness, and to examine and verify all records, in connection with the services and instructions to be performed under this agreement.

ARTICLE VII. The Director of Military Aeronautics reserves the right to determine the adaptability of students for instruction in ground training; and at any time may withdraw such students as in the judgment of authorized representatives of the Director of Military Aeronautics do not appear to possess the necessary aptitude.

ARTICLE VIII. The contractor assumes responsibility for all damage, loss or destruction of equipment by students during the course of instruction and tests.

ARTICLE IX. The contractor further agrees to hold and save the United States harmless from and against all and every demand, or demands, of any nature or kind, for or on account of, the use of any patented invention, article, or process included in work to be done under this contract, which has not been directed to be used by the Director of Military Aeronautics.

ARTICLE X. Neither this contract nor any interest herein shall be transferred to any other party or parties, and in case of such transfer, the United States may refuse to carry out this contract either with the transfered or the transferee, but all rights of action for any breach of this contract by said contractor are reserved to the United States.

ARTICLE XI. No member of, or delegate to Congress, nor any person belonging to, or employed in, the military service of the United States, is or shall be admitted to any share or part of contract, or to any benefit which may arise therefrom. However, if this contract is made with an incorporated company, this stipulation, so far as it relates to members or delegates to Congress, is not to be construed to extend to this contract.

[illegible] University of California shall be determined by [illegible] committee appointed for the purpose of so determining [illegible] of this agreement shall appoint one member of [illegible] members so appointed shall agree upon a third. [illegible] reasonable expenditures incurred and [illegible] paid, the parties hereto further agree to [illegible] decisions rendered by any two of the three members [illegible]

[illegible] contractor shall at all times cooperate to the best [illegible] of the United States may determine as commandant at [illegible] to fulfill the above stipulations in a manner best [illegible] the wishes of the Director of Military Aeronautics.

[illegible] contractor shall permit representatives of the United [illegible] school at any and all times to witness or supervise [illegible] and examine all equipment, to pass upon its fit- [illegible] all records, in connection with the services and [illegible] under this agreement.

[illegible] The Director of Military Aeronautics reserves the right [illegible] students for instruction in ground training; and [illegible] students as in the judgment of authorized representa- [illegible] examinations do not appear to possess the necessary [illegible]

[illegible] contractor assumes responsibility for all damage, loss or destruction [illegible] by students during the course of instruction and tests.

[illegible] contractor further agrees to hold and save the United [illegible] all and every demand, or demands, of any nature [illegible]

[illegible] tion for any breach of this contract by said con- [illegible] ted States.

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Contract.

ARTICLE XII. That it is expressly agreed and understood that this contract shall be non-effective until an appropriation adequate to its fulfillment is made by Congress and is available.

ARTICLE XIII. This contract shall be subject to approval of the Director of Military Aeronautics.

IN WITNESS WHEREOF, the parties aforesaid have hereunto placed their hands the date first hereinbefore written.

WITNESS:

.....as to)

.....as to)

(signed) T. M. Putnam .....as to)

(Signed) Morse A. Cartwright .....as to)

(Signed) C. G. Edgar .....
Colonel, Air Service Aeronautics, Chief of Supply Section, Division of Military Aeronautics, for and in behalf of the United States of America, Party of the First Part.

The Regents of the University of California

By

(Signed) Benj. I. Wheeler .....
President.

E. ORGANIZATION AND ADMINISTRATION

1. GENERAL

The following discussion on Organization and Administration of the school applied to the administrative organization entirely, and does not include the organization of the cadet corps which will be taken up later under the head of the Cadet Corps.

The operation of the School of Military Aeronautics was originally under the direction of the Chief Signal Officer, being later transferred under the jurisdiction of the Director of Military Aeronautics at the time of the organization of the Air Service. The local authority in charge was the Commandant of the School, this man being the direct representative of the Director of Military Aeronautics. Memorandum No. 116, dated August 29th, 1917, advised that "the official organization of a U. S. School of Military Aeronautics calls for a Commandant and three assistants, viz., a President of the Academic Board, and Adjutant and a Supply Officer."

The work of the School might be considered as being made up of military work and academic work. The Commandant is in complete charge of the School, being responsible for the character of both the military and academic instruction given. In direct charge of the academic work of the School and representing the University, is the President of the Academic Board. The Presidnet of the Academic Board is responsible for obtaining instructors for the School and is directly responsible to the Commandant for the character of instruction given.

As showing the general duties of the Commandant and President of the Academic Board, and showing the division of authority between the two, the following paragraphs taken from Memorandum No. 128, dated September 1, 1917, are quoted.

"The Commandant has general supervision over the entire School and is the Commanding Officer of the troops on duty at the School. It is his duty to make frequent inspection of the tuition furnished by the University under contract with the War Department. It is his duty to take up with the President of the Academic Board deficiencies in instruction and the character of the instructors. It is expected that the President of the Academic Board will carry out the requests of the Commandant and will discharge such instructors as are in the opinion of the Commandant not competent to carry on instruction. It is the duty of the Commandant to report to the Chief Signal Officer any failure on the part of the President of the Academic Board to carry out his requests.

"The Commandant is in direct charge of all students and orders to students should issue from him or from some officer authorized by him. The President of the Academic Board is in charge of all instructors and instructions to them will be

ORGANIZATION AND ADMINISTRATION

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"The Commandant is in direct charge of all students and orders to students should issue from him or from some officer authorized by him. The President of the Academic Board is in charge of all instructors and instructions to them will be

issued by the President of the Academic Board rather than by the Commandant."

The statements in the above paragraphs quoted from Memorandum No. 128 have been carefully observed in this School, but those paragraphs do not show the entire responsibility of the President of the Academic Board. This official is the direct representative of the University in the School, and in addition to being responsible to the Commandant, is also responsible to the President of the University. It has been one of his duties to coordinate the work of the School of Military Aeronautics with the other departments of the University which were in operation during most of the time when the School of Military Aeronautics was in operation, particularly in the matter of securing proper cooperation with other departments in such matters as joint use of equipment, buildings, etc. The Presidnat of the Academic Board employed all civilian instructors, laboratory assistants and others necessary to the conduct of the work of instruction by means of recommendations to the President of the University. Futhermore, he supervised on behlaf of the University all expenditures of funds made for the School of Military Aeronautics. All of these duties of course were carried out in close cooperation with the Commandant of the School. The duties of the President of the Academic Board were entirely non-military and he had no direct communication with the cadets, except from the instructional point of view in matters related to grades and other academic records.

Charts showing the organization of a U. S. School of Military Aeronautics have been received from the War Department from time to time, the one on page 35 of this report being one of the latest received by this School. This chart is fairly accurate as regards the military side of the School, but as noted above, does not show the dual responsibility of the President of the Academic Board and his relation to the President of the University and other departments of the University such as the Comptroller's office, Superintendent of Buildings, etc. The cadet organization as shown in this chart was not followed exactly as outlined there. This question, however, is taken up further under the subject of the Cadet Corps.

2. COMMANDANT

The chart referred to above shows fairly completely the organization of the office of the Commandant with the exception that the organization for the military instruction of cadets was slightly different from what is shown in this chart. The officer in direct charge of the military instruction was the head of the Drill and Discipline Department to whom were responsible the drill instructors and squadron commanders of the various squadrons.

The following officers have served as Commandant of this School:

Major Arnold N. Krogstadt, from the opening of the school on May 21st, 1917, to October 1, 1917.

Captain Francis M. Iglehart, (by virtue of rank) from October 1, 1917 to October 8, 1917.

Lieut.-Colonel George B. Hunter, from October 8, 1917 to October 24, 1918. (Lieut. Colonel Hunter was absent on leave from October 24, 1918 to November 24, 1918, being relieved as Commandant on the latter date.)

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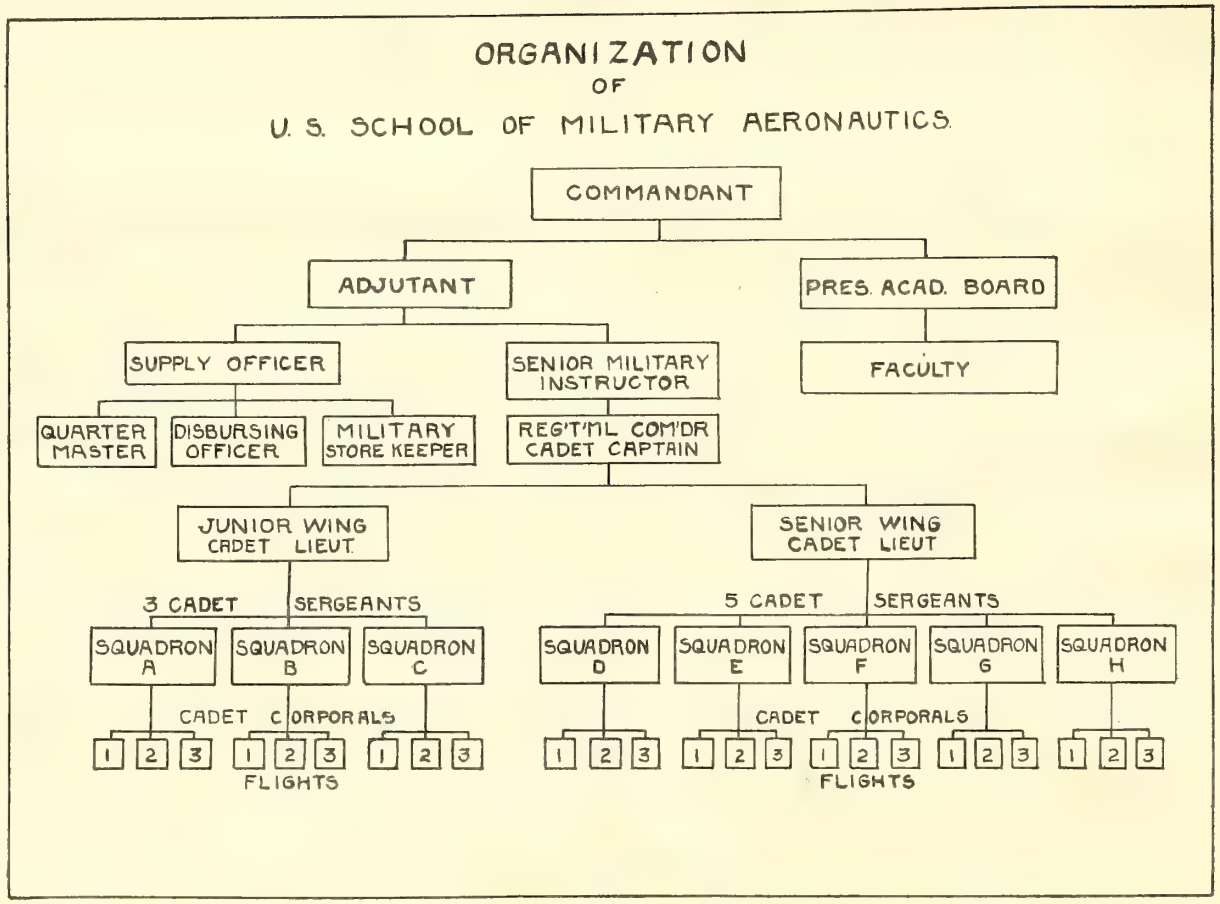
ter date.)


ORGANIZATION
OF
U. S. SCHOOL OF MILITARY AERONAUTICS
COMMANDANT
ADJUTANT
PRES. ACAD. BOARD
SUPPLY OFFICER
SENIOR MILITARY INSTRUCTOR
FACULTY
QUARTER MASTER
DISBURSING OFFICER
MILITARY STORE KEEPER
REG'T'ML COM'DR CADET CAPTAIN
JUNIOR WING CADET LIEUT.
SENIOR WING CADET LIEUT
3 CADET SERGEANTS
5 CADET SERGEANTS
SQUADRON A
SQUADRON B
SQUADRON C
SQUADRON D
SQUADRON E
SQUADRON F
SQUADRON G
SQUADRON H
CADET CORPORALS
CADET CORPORALS
1 2 3
FLIGHTS
FLIGHTS

Surgeon

[illegible]

Major, Sig. Corps, [illegible]

Adjutant

[illegible]

Captain, Signal Corps, [illegible]

Supply Officer

[illegible]

1st Lt. C. S. R. C., [illegible]

Post Surgeon

[illegible]

[illegible] Med. R. C.

Post Dental Surgeon

[illegible]

1st Lieut. [illegible] R. C.

Board of Examiners

[illegible]

[illegible]

[illegible]

[illegible]

Prof. [illegible]

Mr. E. [illegible]

[illegible]

Major Charles B. Crane, Acting Commandant from October 24, 1918, to November 24, 1918, when Lieut.-Colonel Hunter was relieved, and Commandant from November 24, 1918, to the final closing up of the school. The last squadron graduated on February 1, 1919, Major Crane however remaining on duty for some weeks after that date.

In the early weeks of the School, in addition to his other duties the Commandant was appointed on the Board of Examiners to examine applicants for the School, this board being organized in W.D.S.O. No. 132, dated June 8, 1917. This Examining Board was shortly thereafter transferred to San Francisco, and Major Krogstadt relieved from duty on same on account of pressure of duties connected with the School. The Commandant's office submitted to the Director of Military Aeronautics from time to time such reports as were called for by that office. The Commandant presided at all meetings of the Board of Examiners and Discharge Boards. He made weekly inspections of the barracks and of the cadet corps on the field, and has also made frequent tours of inspection of the character of instruction being given to the cadets. Practically all of the necessary clerical help for the office of the Commandant was supplied by the University and charged against the tuition account. During the Xmas vacation 1917-18 the Commandant made a trip to the School of Military Aeronautics at Austin, Texas.

8. PRESIDENT OF THE ACADEMIC BOARD.

As noted above, the President of the Academic Board was in direct charge of all instruction given by the School, and was directly responsible to the Commandant for the type of instructor employed and for the character of the instruction given.

Dr. Baldwin M. Woods was President of the Academic Board from the time the School opened in May, 1917, until its close in 1919. Dr. Woods was Associate Professor of Theoretical Mechanics at the University of California, and was a member of the committee from this University at the conference in Toronto, prior to the opening of the Ground Schools. The closest cooperation has existed between Dr. Woods, as President of the Academic Board, and the Commandants representing the War Department. The excellent organization of the academic side of the School, the thoroughly efficient character of instruction and the small financial deficit existing at the close of the School have been due to the efforts of Dr. Woods, assisted by strong committees selected by him from the members of the staff.

During the early months of the School the President of the Academic Board appointed several committees to assist in the administration of the work of his office. He also appointed Mr. J. A. Polhemus as Assistant to the President of the Academic Board, and later Mr. G. M. Thomas was appointed Vice-President of the Academic Board. Professor B. F. Raber has served as the Advisory Member of the Academic Board in addition to being President of the Board of Examiners. Professor Raber's assistance in drawing up plans for the buildings constructed by the School, and in making suggestions regarding improvements in the buildings and equipment from time to time was valuable.

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In the early weeks of the School, in addition to his other duties the Commandant was appointed on the Board of Examiners to provide equipments for the School, this Board being organized by G.O. 147, dated June 6, 1917. This Training Camp Board was directly subsequently transferred to San Francisco, and Major Dorsenbaugh relieved from duty on account of pressure of duties connected with the School. The Commandant's office subsidized to the Director of Military Aeronautics from time to time such reports as were called for by that office. The Commandant presided at all meetings of the Board of Examiners and Engineering Boards. He made weekly inspections of the barracks and of the cadet corps on the field, and was also much frequent hours of instruction of the squadron of instruction being given to the cadets. Practically all of the necessary clerical help for the office of the Commandant was furnished by the Commandant and charged against the building account. During the June vacation 1917-18 the Commandant made a trip to the school of Military Aeronautics at Austin, Texas.

3. PRESIDENT OF THE ACADEMIC BOARD.

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The following committees were appointed by the President of the Academic Board from the members of the staff of the School to assist in the various branches of the work as outlined below:

Budget Committee, -Lieut. Howard L. McLean, Chairman; Lieut. Gilbert M. Thomas. The duties of the Budget Committee are explained under the Financial Record in this report. The formation of this Committee was considered advisable in order that closer watch over the expenses of the School could be kept.

Equipment and Buildings Committee, -Professor B. F. Raber, Chairman; Lieut. R. A. Waite. The duties of this Committee were to make suggestions as to desirable changes in buildings and equipment, and to submit any plans desired by the President of the Academic Board for new buildings or special equipment.

Publications Committee, -Mr. H. A. White, Chairman; Lieut. Gilbert M. Thomas and Lieut. Allyn G. Smith. The duties of this Committee were to pass upon various matter submitted by the different departments for printing or mimeographing, also to design forms for use in the offices of the President of the Academic Board and the Commandant. The Circular of Information included as Appendix E1 which was given to entering cadets in A squadron each week was prepared by the Publications Committee so that new men might be given some definite and concise information regarding the organization of the School.

Schedule and Curriculum Committee, -Lieut. Gilbert M. Thomas, Chairman; Lieut. David J. Conant. As the instruction work of the School became more complicated it was necessary to have a committee appointed to see that the schedule was properly arranged every week in accordance with the curriculum then in effect, also to secure proper cooperation between the School and the University in order to avoid conflicts in the use of rooms or equipment.

The personnel of the above named committees changed from time to time as the staff of the School changed, the names given above being the men who were serving on these committees shortly before the closing of the School.

As a means of keeping in touch with the work that the School was to do, and in order to gain first hand ideas of what was expected of the School, and what was being done by the other Schools of Military Aeronautics, the President of the Academic Board made two separate trips to Washington, and while on these trips visited the work of some of the other Schools of Military Aeronautics.

The following committees were appointed by the President of the Academic Board from the members of the staff of the School to assist in the various branches of the work as outlined below:

Budget Committee, -Lieut. Edward L. Beaman, Chairman; Lieut. Gilbert M. Thomas. The duties of the Budget Committee are explained under the Financial Record in this report. The formation of this Committee was considered advisable in order that closer watch over the expenses of the School could be kept.

Equipment and Buildings Committee, -Lieutenant L. C. Weber, Chairman; Lieut. R. A. Waite. The duties of this Committee were to make suggestions as to desirable changes in buildings and equipment, and to submit any plans desired by the President of the Academic Board for new buildings or special equipment.

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As a means of keeping in touch with the work that the School was to do, and in order to gain first hand ideas of what was expected of the School, and what was being done by the other Schools of Military Government, the President of the Academic Board made two separate trips to Washington, and while on these trips visited the work of some of the other Schools of Military Government.

4. HEADS OF DEPARTMENTS.

During the early operation of the School heads of departments served more or less provisionally, but on September 15, 1917, certain men were definitely appointed as heads of the various departments, the following being the appointments first made on that date.

Engines, - Mr. D. J. Conant.
Theory of Flight, - Mr. H. L. McLean.
Cross Country and General Flying, - Mr. J. A. Polhemus.
Aerial Observation, - Mr. E. N. D'Oyly.
Gunnery, - Lieut. L. T. Jones.
Radio and Signalling, - Lieut. R. B. McPherson.
Military Studies, - Lieut. R. J. Heffner.

As the size of the School increased, the duties of heads of departments in addition to their work as instructors became more and more of an administrative nature. For example, the head of the Gunnery Department, in certain months of the year 1918, had under his direction from twenty to twenty-three instructors and the work of supervising this department practically precluded any instruction being given by the head of the department. Monthly reports were submitted by each head of department furnishing the information outlined below.

1. A general outline of the organization of the department, showing who was in charge of each branch of the work, if any such division of the work was made.
2. A statement showing the hours of lecture work given, outline of lectures, and by whom given.
3. Hours of laboratory work and by whom handled.
4. Present scheme for handling your laboratory work.
5. Any recent changes made for improving the work in the department.
6. Any suggestions as to how money might be wisely expended in improving the work of the department.

In addition, the head of each department submitted a report each month on the personnel of the instructors in his department on which the pay roll was based. From the above reports it will be seen that the heads of departments assisted materially in the administration of the work of the School. In order to keep in close touch with the work of the departments and with the personnel of the various departments, the President of the Academic Board adopted the plan of being present at the departmental meeting of one department each week, this plan being in effect at the time when the School was at its maximum size and the problem of coordination of effort the most difficult.

2. Heads of Departments.

Under the early operation of the Annual Heads of Departments served very informally, but on September 27, 1917, certain men were officially appointed as heads of the various departments, the following being the initial appointments made on that date:

Engines, - Mr. J. G. Adams.
Theory of Flight, - Mr. H. L. Moleen.
Cross Country and General Flying, - Mr. J. A. Folkemus.
Aerial Observation, - Mr. E. M. D'Oyly.
Gunnery, - Lieut. L. T. Jones.
Radio and Signalling, - Lieut. R. B. McPherson.
Military Studies, - Lieut. J. J. Talley.

As the size of the School increased, the duties of heads of departments in addition to their work as instructors became more and more of an administrative nature. For example, the head of the Country Department, in certain months of the year 1918, had under his direction from twenty to twenty-three instructors and the work of supervising this department practically precluded any instructing being given by the head of the department. Monthly reports were submitted by each head of department furnishing the information outlined below.

1. A general outline of the organization of the department, showing who was in charge of each branch of the work, if any such division of the work was made.
2. A statement showing the number of lectures and giving, outline of lectures, and by whom given.
3. Hours of laboratory work and by whom handled.
4. Present scheme for handling your laboratory work.
5. Any recommendations for improving the work in the department.
6. Any suggestions as to how the School might be wisely expanded in improving the work of the department.

In addition, the head of each department submitted a report each month on the personnel of the instructors in his department on which the pay roll was based. From the above reports it will be seen that the heads of departments assisted materially in the organization of the work of the School. In order to keep in close touch with the work of the departments and with the personnel of the various departments, the President of the Academic Board adopted the plan of being present at the departmental meeting of one department each week, this also being in effect at the Commanding General's meetings on the Academic Board and the problem of coordination of effort the most difficult.

5. BOARD OF EXAMINERS.

a. ORIGIN AND PURPOSE: The Board of Examiners was created by Special Orders No. 5, Headquarters School of Military Aeronautics, Berkeley, California. These orders read as follows: "In compliance with instructions from Chief Signal Officer, a board of examiners is hereby appointed, to meet at the call of the President.

Prof. B. F. Raber	President
Dr. L. T. Jones	Member
Mr. E. N. D'Oyly	Member

The duties of this board will be the setting and marking of examination papers.

General practical questions will be used.

The chief object to be borne in mind, when correcting papers, should be to ascertain whether the candidate has a good working knowledge of the subject from the practical standpoint.

Actual marking will be as follows: Passed with honor.
Passed.
Failed.

The standard for passing shall be that of the University of California.

'Passed with honor' necessitates a mark or grade equivalent to 90 per cent.

All final examination papers will be forwarded to the Commandant through the President of the Academic Board immediately after being marked."

The duties of the Board of Examiners were enlarged and changed materially from time to time after the opening of the School and in August, 1917, the duties of the Board were outlined as follows:

A. To inspect and approve all examination questions before examinations are given.
B. To inspect and approve reports of instructors on all examinations given and to decide on the proper grades for the different papers.
C. To recommend in Squadrons C, G, and H, the proper action to be taken toward any student who has failed in one or more examinations of the week.
D. To recommend from each squadron the best five men.

5. BOARD OF [illegible]

[illegible]

Officer, a board of examiners is hereby appointed, to meet at the call of the President.

Prof. B. F. Raber	President
Dr. L. T. Jones	Member
Mr. R. M. D'Oyly	Member

The duties of this board will be the setting and marking of examination papers.

General practical questions will be used.

The chief object to be borne in mind, when correcting papers, should be to ascertain whether the candidate has a good working knowledge of the subject from the practical standpoint.

Actual marking will be as follows: Passed with honor. [illegible]. [illegible].

The standard for passing shall be that of the University of California.

'Passed with honor' necessitates a mark or grade equivalent to 90 per cent.

All final examination papers will be forwarded to the Commandant through the President of the Academic Board immediately after being marked."

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A. [illegible] all examination questions before examinations are given.
B. To inspect and approve reports of instructors on all examinations given and to decide on the proper grades for the different papers.
C. To recommend in squadrons C, G, and H, the proper action to be taken toward any student who has failed in one or more examinations of the week.
D. To recommend from each squadron the best five men.

It will be noted that one of the duties of the board was the setting and marking of examination papers. It was immediately realized that the work of setting and marking examination papers would be a tremendous task for a board of such size, so these duties were carried out in the following manner:

The examinations were set by the heads of departments and the questions sent to the Board of Examiners for approval. The examination in any subject was given and corrected by the department giving the instruction in that subject. The examination questions, corrected, were then turned over to the Board of Examiners who considered the men who failed to pass. The names of these men were reported to the Commandant, and the men were summoned and interviewed by the Discharge Board. After such interview, they were either demoted for further instruction or relieved from instruction in accordance with the rules laid down by Washington, which changed from time to time.

This method continued for about two and a half months, when owing to the increase in the number of departments and the more technical nature of the instruction, the practice of submitting the questions, was discontinued. The Board, however, still retained its power of supervising and judging the type of questions, in case any criticism of the fairness or type of questions was made. As an example, in one case where such criticism was made, the examination was studied and one question, which was apparently unfair, was discarded, and the grades based on the remaining questions.

In addition to the above work, the Board designed the various forms for reporting grades and for examination papers. Several changes in these forms were due to changes in the curriculum.

After a certain amount of study, the Board laid down the following rules for the conduct of examinations:

1. Questions should be mimeographed, and each cadet provided with a copy. This eliminated the necessity for writing questions on the board, which was at best unsatisfactory.

2. Two instructors should be present at each examination.

3. To minimize the possibility of cheating, cadets were given alternate seats and no note books or paper other than what was given out by the instructor were permitted in the room.

To avoid any possible criticism of the grading of papers, the Board established the rule that no grades between 55 and 60 should be given. If a paper were corrected, and the final grade lay between these values, the paper was re-read and the final grade either raised or lowered. This was done so that no cadet could say that he failed by one or two per cent., and because it was realized that a discrepancy of three or four per cent. might be reasonably expected if different instructors graded the same paper. When the grade "F" was conceived, papers which received a mark lying between 60 and 65 were reconsidered and either raised to 65 or lowered to 60 for the same reason given above.

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The examinations were set by the heads of departments and the questions sent to the Board of Examiners for approval. The examination in any subject was given and corrected by the department giving the instruction in that subject. The examination questions, corrected, were then turned over to the Board of Examiners who examined the men who failed to pass. The names of these men were reported to the Commandant, and the men were summoned and interviewed by the Disciplinary Board. After such interview, they were either demoted for further instruction or relieved from instruction in accordance with the rules laid down by Washington, which changed from time to time.

This method continued for about two and a half months, when owing to the increase in the number of departments and the more technical nature of the instruction, the practice of submitting the questions, was discontinued. The Board, however, still retained its power of supervising and judging the type of questions, in case any criticism of the fairness or type of questions was made. As an example, in one case where such criticism was made, the examination was studied and one question, which was apparently unfair, was discarded, and the grades based on the remaining questions.

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b. METHOD OF OPERATION: The routine work of the Board was as follows: Examination grades and papers were submitted to the clerical force of the Office of the President of the Academic Board. These grades were then entered on summary sheets, which contained when complete, the name of the cadet with the grade given in each subject entered opposite the name. These papers were submitted to this office on Friday morning, and at the time when the enrollment was a maximum, the work of entering the grades on the summary sheets was very difficult, as they were to be ready for the Board of Examiners by one o'clock on Friday.

The summary sheets being completed, the Board examined the record of each cadet for the work in question, and by the use of the report cards, the record for previous weeks when necessary. The names of men liable to demotion or discharge were recorded with the reason for so doing, and forwarded to the Commandant. A list of men to be summoned before the Discharge Board, which met on Saturday afternoon, was made from this record, and posted for the cadets.

c. PERSONNEL OF BOARD: The original board consisted of three members:

Prof. B. F. Raber	President
Dr. L. T. Jones	Member (Later commissioned 1st Lieut. A.S.S.L.)
Mr. E. N. D'Oyly	Member

On October 3, 1917, a Discharge Board was created with the personnel shown below:

Commandant	President of Board
Adjutant	Member
Lt. L. T. Jones	"
Lt. R. J. Heffner	"
Lt. R. B. McPherson	"
Prof. B. F. Raber	Acting Advisory Member
Mr. E. N. D'Oyly	" " "

It will be noted that the personnel of the Discharge Board consisted of a Board of Officers and the Board of Examiners. Prior to this time, the Board of Examiners did not sit as members of the Discharge Board. Since the Discharge Board was organized, the organization has always included the members of the Examining Board, so that the Board of Examiners has virtually become a subcommittee of the Discharge Board.

b. Office of Examiners: The routine work of the Board was as follows: Discharge papers and reports were submitted to the clerical force of the Office of the President of the Discharge Board. These papers were then entered on summary sheets, which contained seven columns, the name of the cadet with the grade given in each subject entered opposite the name. These papers were submitted to this office on Friday morning, and at the time when the curriculum was a reality, the work of entering the grades on the summary sheets was very difficult, as they were in be ready for the Board of Examiners by one o'clock on Friday.

The summary sheets being completed, the Board examined the record of each cadet for the work in question, and by the use of the report cards, the record for previous years were necessary. The names of men liable to discharge were recorded with the reason for so doing, and forwarded to the Commandant. A list of men to be examined before the Discharge Board, which met on subsequent afternoon, was made from this record, and posted for the cadets.

c. Personnel of Board: The original board consisted of three members:

Prof. B. T. Baker	President
Dr. L. T. Jones	Member (Later commissioned 1st Lieut. A.S.S.L.)
Mr. E. N. D'Oyly	Member

On October 3, 1917, a Discharge Board was created with the personnel shown below:

Commandant	President of Board
Adjutant	Member
Dr. L. T. Jones	"
Lt. E. L. Leighton	"
Lt. R. B. Mathewson	"
Prof. B. T. Baker	Acting Advisory Member
Mr. E. N. D'Oyly	" " "

It will be noted that the personnel of the Discharge Board consisted of a Board of Examiners and the Board of Examiners. Prior to this time, the Board of Examiners did not act as members of the Discharge Board. Since the Discharge Board was created, the organization has always included the members of the Examining Board, so that the Board of Examiners has virtually become a subcommittee of the Discharge Board.

The personnel has changed somewhat from the original members. Lt. Heffner replaced Mr. D'Oyly and was in turn replaced by Lt. Neil D. Matthews, and Mr. W. Dreyer, (Later commissioned 1st. Lieut. A.S.A.) replaced Lt. Jones. Dr. H. W. Edwards, Inspector of Instruction was added to the Board in August, 1918, so that the board as finally constituted became as follows:

Prof. B. F. Raber	President
Lt. Neil D. Matthews	Member
Lt. W. Dreyer	"
Dr. H. W. Edwards	"

As finally constituted in January, 1918, the board which met every Saturday afternoon to pass on cases recommended for demotion or discharge consisted of the Commandant, Adjutant, President and Vice-President of the Academic Board, Prof. B. F. Raber and Heads of Departments. The recommendations of this body were practically always accepted by the Discharge Board of officers who finally passed upon the question of discharge from the School.

Lt. [illegible] was changed somewhat from the original members. Lt. Neffner replaced Mr. D'Oyly and was in turn replaced by Lt. Neil D. Matthews, and Mr. W. Dreyer, (later commissioned 1st. Lieut. A.S.A.) replaced Lt. Jones. Dr. H. W. Edwards, Inspector of Instruction was added to the Board in August, 1918, so that the board as finally constituted became as follows:

Lt. [illegible]	President
Lt. Neil D. Matthews	Member
Lt. W. Dreyer	"
Dr. H. W. Edwards	"

As finally constituted in January, 1918, the board which met every Saturday afternoon to [illegible] for consideration or disciplinary [illegible] of the Commandant, Adjutant, President and Vice-President of the Academic Board, Prof. E. T. Baker and Heads of Departments. The recommendations of this body were practically always accepted by the Discharge Board of officers who finally passed upon the question of discharge from the School.

F. CURRICULUM.

1. ISSUED BY WAR DEPARTMENT.

The contract under which the University operated the School of Military Aeronautics provided that the training should be given in accordance with such regulations relating to the schedule of instruction as were issued by the Office of the Chief Signal Officer from time to time. The plan of instruction as laid down by the War Department has taken the form of a typed curriculum of instruction. This curriculum has varied in size from the two or three pages issued in the early weeks of operation to the very elaborate schedule of approximately twenty-four pages in October, 1918, covering in detail the work of the School. The term "curriculum" in this report includes the more or less elaborate "syllabus of instruction" which has always been attached to the curriculum and which outlines the work of each department as the War Department desired it to be given. The curricula issued by the War Department have usually been designated by a "Stencil No." and issued under a given date; for example the curriculum of April 1, 1918, was given Stencil No. 157. The effective date, or date the curriculum was actually started, was always several days later than the date under which the curriculum was issued. The course at this School has provided for training Pilots only, until the curriculum of October 1918, which also provided a course for Bombers and Observers.

2. LENGTH OF COURSE.

The length of the course originally adopted by the War Department was eight weeks, divided into a Junior Wing of three weeks devoted largely to intensive military training, and a Senior Wing of five weeks devoted to the more technical subjects of the School. Curricula outlining the work of the eight weeks' course were issued under the following dates: June 5, 1917; June 11, 1917; September 26, 1917, and November 1, 1917. Prior to the receipt of the curriculum dated June 5, 1917, the schedule of instruction was laid out in accordance with the preliminary curriculum adopted by the Universities Committee at Toronto.

In March, 1918, the length of the course was increased to twelve weeks, the change being made in Stencil No. 129 under date of March 1, 1918. This curriculum was revised in Stencil 157 under date of April 1, 1918, which remained in effect until October, 1918.

Under date of October 14, 1918, the curriculum was again revised, the course being enlarged to include training for Bombers and Observers. The course for Pilots remained twelve weeks in length, the course for Bombers being eight weeks and Observers nine weeks.

The insertion of a guard squadron which was authorized by the Chief Signal Officer, while not adding to the amount of instruction, practically increased the length of the course by one week. This guard squadron was in operation during part of the time the eight weeks' course was being conducted, thereby actually making the length of the course nine weeks. During this part of the course the guard squadron followed "C" week and was known as "CX" Squadron. During the twelve weeks' course the effect of the guard squadron

1. [illegible]

The [illegible] under which the University operated the School of Military Aeronautics provided that the training should be given in accordance with such regulations relating to the schedule of instruction as were issued by the Chief of the Signal Officer from time to time. The plan of instruction as laid down by the War Department has taken the form of a typed curriculum or instruction. This curriculum has varied in size from the two or three pages issued in the early weeks of operation to the very elaborate memoranda of approximately twenty-four pages in October, 1918, covering in detail the work of the School. The term "curriculum" in this report includes the more or less elaborate "syllabus of instruction" which has always been attached to the curriculum and which outlines the work of each department as the War Department desired it to be given. The curricula issued by the War Department were usually designated by a "Stencil No." and issued under a [illegible] date. The curriculum of April 1, 1918, was given Stencil No. 127. The effective date, or date the curriculum was actually started, was sometimes later than the date under which the curriculum was issued. The course as [illegible] provided for training pilots only, until the curriculum of October 1918, which also provided a course for Bombers and Observers.

2. LENGTH OF COURSE.

The length of the course originally adopted by the War Department was eight weeks, including [illegible] a Ground School of three weeks followed by three months military training, and a Ground School of five weeks followed by three months technical training. Curricula outlining the work of the Ground Schools were issued under the following dates: June 8, 1917; June 12, 1917; September 22, 1917, and December 1, 1917. Prior to the receipt of the curriculum dated June 7, 1917, the schedule of instruction was laid down in accordance with the preliminary curriculum adopted by the Universities Committee at Toronto.

In March, 1918, the length of the course was increased to twelve weeks, the change being made in Stencil No. 129 under date of March 1, 1918. This curriculum was revised in Stencil 147 under date of April 1, 1918, which remained in effect until October, 1918.

Under date of October 14, 1918, the curriculum was again revised, the course being shortened to include training for Bombers and Observers. The course for Pilots remained twelve weeks in length, the course for Bombers being eight weeks and Observers nine weeks.

The insertion of a guard squadron which was authorized by the Chief Signal Officer, which was added to the course of instruction, practically increased the length of the course by one week. This guard squadron was in operation during part of the time the eight weeks' course was being considered, thereby actually reducing the length of the course nine weeks. During this part of the course the guard squadron followed "C" week and was known as "CX" squadron. During the twelve weeks' course the allotment of the guard squadron

was to make the length of the course thirteen weeks. The guard squadron in the twelve weeks' course was inserted following "F" week and was called "FX" Squadron.

3. DIVISION INTO DEPARTMENTS.

One of the principal topics discussed by the Universities Committee at Toronto was the question of the curriculum. This committee recommended to the War Department an eight weeks' course divided into a Junior Wing of three weeks intensive training in Military Drill and Discipline, use of the Machine Gun and Signalling, followed by a Senior Wing of five weeks of lectures and laboratory work in the more technical branches of the School. The first curriculum issued by the War Department followed very closely the curriculum suggested by the Universities Committee.

The work of the Ground School naturally divides into certain definite departments for the purpose of instruction. There have been a few sub-topics regarding which there has been some difference of opinion as to which department they should be included under, but these were always of minor importance. The names of some of the departments have been changed slightly from time to time but the nature of the work has remained practically the same, taking into account, of course, the enlargement and improvement of the work of the School. Originally the work was divided into seven departments as follows: Aeronautical Engines, Theory of Flight, Cross Country and General Flying, Aerial Observation, Gunnery, Signalling and Radio, and Infantry Drill. In addition, while never considered as a separate department, work was always given in Calisthenics. As the work of the School became more and more standardized by repeated revisions of the curriculum, the six following departments resulted: Military Subjects, Signalling, Gunnery, Airplanes, Engines and Observation. For the purpose of providing recreation a department of Supervised Recreation and Organized Sports was also included in the twelve weeks' curriculum, although this was never included as one of the instructional branches of the School.

Further discussion of the curriculum will be carried out under the following sub-heads: Eight Weeks' Course, Twelve Weeks' Course, and October 14, 1918, Revision of the Twelve Weeks' Course. Copies of the curricula under which the School operated for an appreciable length of time are included as appendices together with the bulletins or memoranda from the War Department which accompanied the curricula when issued, these bulletins or memoranda explaining the reasons for revision and stating what should be gained by the changes. Very little time is devoted to the curricula of June 5, 1917; September 26, 1917, and March 1, 1918, inasmuch as these curricula were revised so soon after issue by the curricula of the following dates: June 11, 1917; November 1, 1917, and April 1, 1918.

Under the subject of Instruction, the curriculum requirements of each department are discussed in more or less detail and tables inserted there to show the successive changes through which the work of each department passed. It is believed the following table will be of interest, summarizing as it does the following points regarding the various curricula: Government Stencil Number, Date of Curriculum, Date Curriculum was Started, Length of Course, and showing by departments, the squadrons receiving instruction, the number of weeks over which instruction extended, andthetotal number of hours instruction.

The 7th week the length of the course thirteen weeks. The guard squadron in the twelve weeks' course was inserted following "T" week and was called "TX" week.

5. Curriculum Committee.

One of the principal topics discussed by the Universities Committee was the question of the curriculum. This committee recommended to the Superintendent an eight week course divided into a shorter step of three weeks duration instead of military drill and discipline, one of the machine gun and signalling, followed by a month's step of five weeks of lectures and laboratory work in the same instructional curriculum of the month. The first curriculum issued by the War Department followed very closely the curriculum suggested by the Universities Committee.

The work of the General School naturally divides into certain definite departments for the purpose of instruction. There have been a few sub-topics appearing with more or less frequency, but there have been differences of opinion as to which departments they should be included under, and there have been changes of place between departments. The names of some of the departments have been changed slightly from time to time. The work of the Ground School has remained practically the same, though the amount of course, the arrangement and supervision of the work of the School, particularly the work has been divided into departments as follows: Aerodynamics, Engines, Theory of Flight, Cross Country and General Flying, Aerial Observation, Photography and Radio, and Military Drill. In addition, which never constituted in a separate department, work was always given in Instructions. In the work of the School there were many and more subdivided by regular revisions of the curriculum, the six following departments remained: Military Tactics, Signalling, Machine, Airplanes, Engines and Observation. For the purpose of providing accessible a department of Supervised Instruction and organized sports was also included in the twelve weeks' curriculum, although this was never included as one of the instructional departments of the School.

Further discussion of the curriculum will be carried out under the following subheads: Eight Weeks' Course, Twelve Weeks' Course, see October 14, 1917, revision of the Twelve Weeks' Course. Copies of the curriculum under which the School operated are appreciable length of time are included as appendices together with the Initiation or memorandum from the Department which accompanied the curriculum when issued. Since minutes or memoranda explaining the reasons for revision and showing when should be placed by the chairman. Very little time is devoted to the curriculum of June 6, 1917; September 20, 1917, and March 1, 1918. Inasmuch as these curricula were revised or amended later by the curricula of the following dates: June 11, 1917; November 1, 1917, and April 1, 1918.

Under the subject of Curriculum, the curriculum requirements of each department are discussed in more or less detail and tables inserted here to show the numerical changes through which the work of each department passed. It is believed the following will be of interest, summarizing as it does the fluctuating points regarding the various curricula: Government School Number, Date of Curriculum, Date Curriculum was Started, Length of Course, and showing by departments, the numerical requirements instruction, the number of weeks over which instruction extended, substantial number of hours instruction.

TABLE NO. 1.

Summary of General Information Regarding the Various Curricula under Which the School Operated.

	Gov't Stencil No.	Date of Curriculum	Date Effective	Length of Course-Weeks	Mil. Sub.	Sig.	Gun.	Airpl	Eng.	Obs	Aids to Flight	Sports
Curriculum of June 5, 1917		6/5/17	6/11/17	8								
Period of Instruction-Sqds												
" " " -Weeks												
Total Hours Instruction												
Curriculum of June 11,1917		6/11/17	6/18/17	8								
Period of Instruction-Sqds					A-C	A-H	A-H	D-G	D-H	G-H		
" " " -Weeks					3	8	8	4	5	2		
Total Hours Instruction					11	38	34	24	35	26	-	-
Curriculum ofSept. 26, 1917	37	9/26/17	10/15/17	8								
Period of Instruction Sqds					A-C	A-H	A-H	D-F	D-F	G-H	D-H	
" " " -Weeks					3	8	8	3	3	2	5	
Total Hours Instruction					110	40	42	25	42	24	25	-
Curriculum of Nov. 1, 1917	37	11/1/17	10/15/17	8								
Period of Instruction-Sqds					A-C	A-H	A-H	D-F	D-F	G-H	D-H	
" " " -Weeks					3	8	8	3	3	2	5	
Total Hours Instruction					93	35	50	24	39	25	24	-

Curriculum.

Summary of General Information Regarding the Various Curricula under Which the School Operated.

	Gov't Control No.	Curriculum	Date of Effective	Date of Termination	Length of Course Weeks	Mil.	Sig.	Eng.	Air	Eng.	Cer.	Aide Tech.	Flight
Curriculum of June 5, 1917			6/5/17	6/11/17	8								
Period of Instruction-Grade													
" " -Weeks													
Total Hours Instruction													
Curriculum of June 11, 1917			6/11/17	6/18/17	8								
Period of Instruction-Grade					A-C	A-H	A-H	D-G	D-H	C-E			
" " -Weeks					3	8	8	4	6	2			
Total Hours Instruction					111	40	24	24	26	12	-	-	
Curriculum June 24, 1917	27		6/25/17	10/1/17	8								
Period of Instruction Grade					A-C	A-H	A-H	D-F	D-F	C-H	D-H		
" " -Weeks					3	8	8	3	3	2	6		
Total Hours Instruction					110	40	42	25	42	24	26	-	
Curriculum of Nov. 1, 1917	87		11/1/17	12/27/17	8								
Period of Instruction-Grade					A-C	A-H	A-H	E-I	D-F	C-E	E-H		
" " -Weeks					3	8	8	3	3	2	6		
Total Hours Instruction					95	35	50	24	39	25	24	-	

TABLE NO. 1. CONTINUED.

	Gov't Stencil No.	Date of Curriculum	Date Effective	Length of Course-Weeks	Mil. Sub.	Sig.	Gun.	Airpl	Eng.	Obs.	Aids to Flight	Sports
Curriculum of March 1, 1918	129	3/1/18	*3/11/18	12								Started
Period of Instruction-Sqds					A-M	A-M	C-M	A-L	C-M	G-L		A-M
" " " -Weeks					12	12	10	11	10	5		12
Total Hours Instruction					190	44	52	47	55	46		144
Curriculum of April 1, 1918	157	4/1/18	*3/11/18	12								
Period of Instruction-Sqds					A-K	A-M	C-M	A-L	B-M	H-M		A-M
Period of Instruction-Weeks					10	12	10	11	11	5		12
Total Hours Instruction					190	43	52	55	59	39		60

*Note:- The curriculum of April 1, 1918, replaced the curriculum of March 1, 1918, as soon as it was received, all squadrons being switched at once to the new curriculum. This was possible inasmuch as only 5 squadrons were operating on Stencil 129 when Stencil 157 arrived on April 15, 1918, and avoided the difficult problem of having three different curricula in operation at the same time. It was necessary to schedule some extra work of course in order to make this change without loss of instruction. The same plan was followed in replacing the curriculum of September 26, 1917, with the curriculum of November 1, 1917.

TABLE NO. 1. CONTINUED.

No.	Gov't Curriculum	Date of Effective	Date of Termination	Length of Sub.						Aids to Flight	
Curriculum of March 1, 1918	120	3/1/18	4/11/18	12							Started
Period of Instruction-Days											
" " -Weeks					12	12	10	11	10	5	12
Total Hours Instruction					120	44	32	17	32	42	144
Curriculum of April 1, 1918	187	4/1/18	4/11/18	12							
Period of Instruction-Days											
Period of Instruction-Weeks					10	12	10	11	11	5	12
Total Hours Instruction					190	43	52	56	59	39	60

Note:- The curriculum of April 1, 1918, replaced the curriculum of March 1, 1918, as soon as it was received, all squadrons being switched at once to the new curriculum. This was possible inasmuch as only 2 squadrons were operating on Tarcoll 120 when Tarcoll 187 arrived on April 18, 1918, and avoided the difficult problem of having three different curricula in operation at the same time. It was necessary to schedule some extra work of course in order to make this change without loss of instruction. The same plan was followed in replacing the curriculum of September 26, 1917, with the curriculum of November 1, 1917.

TABLE NO. 1. CONTINUED.

	Gov't Stencil No.	Date of Curriculum	Date Effective	Length of Course Weeks	Mil. Sub.	Sig.	Gun.	Airpl	Eng.	Obs.	Aids to Flight	Sports
Curriculum of Oct.14,1918- Pilots--	272	10/14/18	10/21/18	12								
Period of Instruction-Sqds					A-F	A-K	H-M	C-M	D-K	B-M		A-M
" " " -Weeks					5	6	5	7	7	9		12
Total Hours Instruction					173	29	62	61	69	66		60
Curriculum of Oct. 14, 1918 -Bombers	272	10/14/18	10-21-18	8								
Period of Instruction-Sqds					A-F	A-H	E-H	C-D	D	B-H		A-H
" " " - Weeks					5	6	4	2	1	7		8
Total Hours Instruction					140	34	37	24	10	65		40
Curriculum of Oct. 14, 1918, Obsers	272	10/14/18	10/21-'18	9								
Period of Instruction-Sqds					A-F	A-I	E-I	C-D	D	B-I		A-I
" " " -Weeks					5	6	5	2	1	8		9
Total Hours Instruction					150	34	42	24	10	85		45

TABLE NO. I. - CONTINUED.

| Course | No. | Curriculum | Effective | Length of Course Weeks | Sub. | | |

Curriculum.

By referring to the above table and to the copies of the curricula attached as appendices, certain general points might be noted. The theoretical work in Military Subjects was practically always condensed in the earlier weeks of the course, it being essential that proper knowledge of military matters be obtained as soon as possible; also the practical part of this department, consisting principally of drill, was continued throughout the entire course. Practical work in Signalling, until the curriculum of October 14, 1918, also extended throughout the entire course. In the last curriculum the work in Signalling was largely condensed in the first three weeks, followed by an examination in the third week and another examination toward the end of the course with very little intermediate work being scheduled, it being expected that outside practice would maintain the proper standard for graduation. Due to the signing of the armistice and consequent reduction of work in signalling, this plan was never tried out. Knowing, however, the ease with which cadets were able to slide back in their ability to send and receive the code (as exemplified to the detriment of the miniature range work in the Observation Department), it is not believed the latter schedule would have produced the best results in the final analysis. The work in Gunnery has always extended throughout the entire course or else has been condensed in the later weeks of the course, so that this work could be carried on without interruption upon reaching the flying schools.

The opinion of the heads of the Airplanes and Engines Departments has been that best results were obtained in these two departments when the work was condensed in a few weeks as in the curricula of November 1, 1917, and October 14, 1918, rather than being spread over practically the entire course as in the curriculum of April 1, 1918. The work of the Observation Department has always been concentrated in the last few weeks of the course until the curriculum of October 14, 1918, was issued. In this curriculum the work of this department was increased so greatly that it was necessary to spread it over from seven to nine weeks.

4. EIGHT WEEKS' COURSE.

The Universities Committee at Toronto originally recommended an eight weeks' course divided into a Junior and Senior Wing as noted above. This division of the work, which provided very largely for military instruction only in the Junior Wing, was very fortunate at the opening of the School in that it allowed an additional three weeks for the Universities to prepare for the more technical instruction beginning the fourth week. When the work started on May 21, 1917, this University had received no official copy of the curriculum from Washington, but having on hand the curriculum which was adopted by the conference at Toronto the work of the first two or three weeks was planned according to the scheme there adopted.

The following telegram received from the Chief Signal Officer on May 19, 1917, outlined briefly the work of the first few weeks:

"The Commandant of the School of Military Aeronautics,
University of California, Berkeley, Calif.
For Military instructions first three weeks use Infantry Drill Regulations paragraphs one to two fifty seven inclusive and seven ninety two to eight hundred three inclusive.

The Universities Committee at Toronto originally recommended an eight weeks' course divided into a Junior and Senior Wing as noted above.

Curriculum.

> Give two hours drill and one half hour calisthenics every morning except Sunday, and two hours Drill every afternoon except Saturday and Sunday. If possible give Machine Gun instructions or Small Arms Target Practice every afternoon except Saturday and Sunday. Give one hour lecture on Army Regulations or Customs of the Service or Formation of Troops and similar topics every morning except Sunday ... Squier".

From this telegram it will be seen that for the first three weeks cadets were required to drill four hours a day, reserving one hour a day for lectures on Military Subjects or allied subjects. As being of interest, Appendix F1 attached to this report, shows the curriculum for the Senior Wing and the schedule first put in effect on May 21, 1917. As the curriculum was changed rapidly in the early weeks, the schedule was never carried out as outlined in Appendix F1.

Appendix F2, curriculum revised June 5, 1917, was the first official outline of the curriculum to be used for the Senior Wing received by this University. This shows the work of the Senior Wing to be divided into the following departments, each department having allotted to it the number of hours noted:

Engines	35 hours,
Theory of Flight	23 "
Cross Country & General Flying	15 "
Aerial Observation	26 "
Gunnery	22 "
Wireless	20 "

The Military Subjects Department, which was given largely in the Junior Wing at that time, contained only eleven lectures on Military Subjects, the balance of the time being devoted to Drill. Frequent minor changes in the curriculum not noted in this report were made during the early weeks of operation and the numerous changes and revisions made it very difficult for the earlier squadrons to receive all the instruction called for. By scheduling work in the evening on certain occasions, however, very little work was actually missed.

Under date of June 11, 1917, the curriculum for the School of Military Aeronautics was again revised. This curriculum rearranged the subject matter somewhat under the various departments, but it did not change materially the number of hours of work given in each department. Attached to this curriculum was also a "Syllabus of the Course of Study", outlining very briefly the work to be given under each topic and furnishing references to various texts and periodicals which would be of help to the instructors in outlining their courses. Appendix F3 is a copy of the curriculum revised June 11, 1917. The "Syllabus of the Course of Study", however, is not included in Appendix F3 inasmuch as this syllabus has been revised from time to time and a later appendix will show the syllabus as finally adopted for the eight weeks' course. The curriculum of June 11, 1917, did not furnish a division of time by weeks for the various departments. Under date of July 10, 1917, the following distribution of instructional time by hours was sent out by Washington to apply to the Senior Wing instruction of the curriculum of June 11, 1917. This was put into effect for squadrons A, B, C, and D on July 30, 1917, and one additional

two hours drill and one half hour calisthenics every [illegible] except Sunday, and two hours Drill every afternoon except Saturday and Sunday. If possible give Machine Gun instructions or Small Arms Target Practice every afternoon except Saturday and Sunday. Give one hour lecture on Army Regulations or Customs of the Service or Formation of Troops [illegible]

From this telegram it will be seen that for the first three weeks cadets were required to drill four hours a day, reserving one hour a day for lectures on [illegible] attached to this report, shows the curriculum for the Senior Wing and the schedule first put in effect on May 21, 1917. As the curriculum was changed [illegible]

Appendix #2 , curriculum revised June 5, 1917, was the first [illegible] this University. This shows the work of the Senior Wing to be divided into [illegible]:

Engines	85 hours,
Theory of Flight	25 "
Gross Country & General Flying	15 "
Aerial Observation	26 "
[illegible]	21 "
[illegible]	25 "

The Military Subjects Department, which was given largely in the [illegible] the balance of the time being devoted to Drill. Frequent minor changes in the curriculum not noted in this report were made during the early weeks of operation and the numerous changes and revisions made it very difficult for the earlier squadrons to receive all the instruction called for. By scheduling [illegible] actually missed.

Under date of June 11, 1917, the curriculum for the School of [illegible] the number of hours of work given in each department. Attached to this curriculum, Appendix #3 is a copy of the curriculum revised June 11, 1917. [illegible] courses. Appendix #3 is a copy of the curriculum revised June 11, 1917. [illegible] "Syllabus of the Course of Study", however, is not included in Appendix [illegible]

The curriculum of June 11, 1917, did not furnish a division of time by weeks [illegible] into effect for squadrons A, B, C, and D on July 30, 1917, and one additional

squadron each week thereafter made to conform to this outline.

	Sqd D.	Sqd. E.	Sqd F.	Sqd G.	Sqd H.	Total
Signals	6	6	5	3		20
Engines	10	8	8	6	3	35
Gunnery	5	5	5	4		19
Th. Flight	4	7	6	4		21
C.C.& A.F.	4	3	3	2		12
Aer. Obs.			2	4	20	26

Under date of September 21, 1917, a revised course of study prescribed for the United States Schools of Military Aeronautics was outlined in Stencil No. 37, and under date of September 26, 1917, as a supplement to Stencil No. 37, the revised curriculum for the United States Schools of Military Aeronautics was issued superseding the curriculum of June 11, 1917. On November 1, 1917, a second supplement to Stencil No. 37 was sent out superseding the supplement of September 26th. The curricula issued on the above dates were the first in which the division of hours by weeks was made. Appendix F4 contains a copy of the second and first supplements to Stencil No. 37 and also a copy of Stencil No. 37. This curriculum and course of study being a final revision of the eight weeks' course is enclosed in full as showing the progress made in outlining the work under the eight weeks' course. Included also as a part of Appendix F4 are the following letters bearing on the curricula of September 26, 1917, and November 1, 1917, explaining the changes made in the former curriculum, what was to be expected in the revision and points to be emphasized. These documents are very complete and for that reason are attached to the curricula, making further description of the work required unnecessary at this point.

Memorandum No. 202 For All Schools, dated September 28, 1917,
Memorandum No. 230 For All Schools - Subject: Course of Study, dated October 19, 1917,
Bulletin No. 75 to All Schools - Subject: Curriculum Revised November 1, 1917, dated November 5, 1917,
Memorandum No. 247 for All Schools - Subject: General Summary of Remarks on the Course of Study in the Schools of Military Aeronautics, dated November 12, 1917.

It will be noted from the curriculum of November 1, 1917, that the names and the number of hours devoted to each department have been changed as follows:

Military Studies	110 hours,
Signalling & Radio	40 "
Gunnery	42 "
Aids to Flight	25 "
Airplanes	25 "
Engines	42 "
Aerial Observation	24 "

The department of "Theory of Flight" under the curriculum of

[illegible]

	Sch. 1.	Sch. 2.	Sch. 3.	Sch. 4.	Sch. 5.	Total
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Under date of September 21, 1917, a revised course of study governing for the United States Schools of Military Aeronautics was issued as Schedule No. 37, and under date of September 28, 1917, as a supplement to Schedule No. 37, the revised curriculum for the Ground Officer Schools of Military Aeronautics was issued superseding the curriculum of June 11, 1917. On December 1, 1917, a second supplement to Schedule No. 37 was issued superseding the supplement of September 28. The curricula issued on the above dates were the first to which the Division of Schools by which was made. Appendix 14 contains a copy of the second and first supplements to Schedule No. 37 and also a copy of Schedule No. 37. This curriculum and course of study being a final revision of the eight weeks' course in preparation to fall in showing the progress made in molding the very under the eight weeks' course. Included also as a part of Appendix 14 are the following letters relative to the curriculum of September 28, 1917, and December 1, 1917, expressing the changes made in the former curriculum, that was to be expected in the revision and points to be emphasized. These documents are very complete and for that reason are attached to the curricula, making further consideration of the work required unnecessary at this point.

[illegible] 0.0 For All Schools, dated September 28, 1917.
[illegible] 0.0 For All Schools - Subject: Course of Study, dated December 1, 1917.
[illegible] 0.0 For All Schools - Subject: Curriculum Revised November 1, 1917.
[illegible] 0.0 For All Schools - Subject: General Answer of Changes in the Course of Study in the Schools of Military Aeronautics, dated November 14, 1917.

It will be noted from the curriculum of November 1, 1917, that the number and the number of hours devoted to each department have been changed as follows:

Military Studies	110 hours,
Signalling & Radio	40 "
[illegible]	[illegible] "
[illegible]	[illegible] "
[illegible]	[illegible] "
[illegible]	[illegible] "
[illegible]	42 "
[illegible]	[illegible] "

The [illegible] of "Theory of Flight" under the curriculum of

June 11, 1917, was changed to "Airplanes" and the department of "Cross Country and General Flying" was changed to "Aids to Flight". The course of study under the curriculum of November 1, 1917, is based on a seven-hour working day for Monday to Friday inclusive, and four hours on Saturday. In addition the cadets were required to devote two hours of study in the evening each day.

5. TWELVE WEEKS' COURSE.

Under date of March 1, 1918, the curriculum was again revised and sent out as Stencil No. 129, superseding Stencil No. 37, and the two supplements dated September 26th and November 1st, 1917. The curriculum outlined in Stencil No. 129 was started in this School with the class beginning Monday, March 11, 1918. This curriculum provided for a twelve weeks' course and rearranged the departments and hours devoted to each department as follows:

Miliary Subjects	190 hours
Signalling	44 "
Gunnery	52 "
Airplanes	47 "
Engines	55 "
Aerial Tactics	46 "

It will be noted from the above that the "Aids to Flight" Department was eliminated, the work formerly being given in this Department being absorbed in the Airplanes and Aerial Tactics Department. Another department included in the twelve weeks' course was that of Supervised Recreation and Organized Sports, Stencil No. 129 calling for two hours daily to be devoted to such sports as football, soccer, baseball, basketball, track athletics, etc. The method of carrying out this part of the work will be taken up more in detail under the subject "Instruction". In April, 1918, a slight change in the curriculum was made by the introduction of a course in Anti-Gas. This consisted of three hours theoretical work and four hours practical work, the time for which was to be taken from the drill hours.

Under date of April 1, 1918, the curriculum was again revised in Stencil No. 157, which superseded Stencil No. 129. As the curriculum of March 1st was only about four or five weeks in operation it was possible to shift immediately to the revision of April 1st. This curriculum of April 1st changed the name of Aerial Tactics to Observation and eliminated several of the subjects which were included in the Department of Aerial Tactics in Stencil No. 129. The Departments of Airplanes and Engines were somewhat changed by the addition of several hours laboratory work. Appendix F5 contains a copy of Stencil No. 129, the revised curriculum of March 1, 1918, and a copy of Stencil No. 157, the revised curriculum of April 1, 1918. The syllabus of the course of study of Stencil 157 only is included as Stencil 129 was revised and superseded immediately after being started.

Also included in Appendix F5 are copies of Memorandum No. 236 for All Schools, dated February 28, 1918, and Memorandum No. 297 for All Schools, dated April 4, 1918. Memorandum No. 236 accompanied the curriculum of March 1, 1918, and explains the objects of increasing the length of course and results hoped to be obtained. Memorandum No. 297 accompanied the curri-

Airplane Instruments	120	hours
Aerial Tactics	46	"

Under date of April 1, 1918, the curriculum was again revised in Memorandum No. 129 for Airplanes and Engines were somewhat changed by the addition of several hours laboratory work. Appendix T5 contains a copy of Memorandum No. 129, the revised curriculum of March 1, 1918, and a copy of Memorandum No. 127, the revised curriculum of April 1, 1918.

Also included in Appendix T5 are copies of Memorandum No. 236 for [illegible] 1918. Memorandum No. 237 accompanied the curri-

culum of April 1, 1918, explaining the necessity for this revision and furnishing a description of the work in Airplanes and Engines heretofore given at the Flying Schools which was in the future to be given by the Ground Schools.

The change from eight to twelve weeks' course was decided upon in order that certain subjects heretofore given in the Flying Schools would be given as far as possible in the Ground Schools. In order to take up this additional work it was necessary to increase the curriculum of November 1, 1917, by the following amounts:

Military Subjects	increased by	75	hours
Airplanes	" "	21	"
Engines	" "	20	"
Map Reading & Artillery Observation -	" "	12	"

The taking over of this additional work made it necessary to revise the curriculum of March 1, 1918, hence Stencil No. 157 of April 1st, was issued. To make room for this increase it was necessary to drop from Stencil No. 129 the courses in Pursuit, Bombing, Cooperation with Infantry, Reconnaissance and Photography; also the time devoted to Sports was changed from two hours daily to five hours a week to be distributed at the discretion of the Commandant.

6. OCTOBER 14, 1918, REVISION OF TWELVE WEEKS' COURSE.

Under date of October 14, 1918, the curriculum was again revised in Stencil No. 272. This latest revision provided for a twelve weeks' course for Pilots, an eight weeks' course for Bombers, and a nine weeks' course for Observers, the course of instruction being the same for all three schools up through the fourth week. At the end of the fourth week, by means of an elaborate system of rating and also giving due weight to the candidate's preference, the squadrons were divided into the three classes, Pilots, Bombers, and Observers. The new curriculum added under the Observation Department fairly extensive courses in Navigation and Photographic Interpretation, and reduced the work on the Miniature Range. The other departments were changed slightly but agreed very closely with the work outlined in Stencil No. 159. Appendix F6 contains a copy of Stencil 272 and also contains a copy of Bulletin No. 348 to all Schools, dated November 6, 1918, which accompanied the mimeographed copies of Stencil No. 272, explaining certain features of the latest revision of the curriculum.

Memorandum No. 340, copy of which is included in Appendix F7 in addition to revising the discharge rules, stated the method by which cadets were to be divided among the three classes, (Pilots, Bombers and Observers) noted above. A Rating Board was appointed and special forms devised to facilitate the work of the Rating Board. Shortly after the signing of the armistice the method of division outlined in Memo. No. 340 was discontinued and cadets who had been assigned as Observers and Bombers

The taking over of this additional work made it necessary to revise the Stencil No. 129 the courses in Pursuit, Bombing, Cooperation with Infantry, and Observers. The new curriculum added under the Observation Department reduced the work on the Miniature Range. The other departments were changed

Appendix F6 contains a copy of Stencil 272 and also contains a copy of the latest revision of the curriculum.

Memorandum No. 340, copy of which is included in Appendix F7 devised to facilitate the work of the Rating Board. Shortly after the aligning of the armistice the method of division outlined in memo. No. 340 was discontinued and cadets who had been assigned as Observers and Bombers

against their preference were allowed to join the Pilots' course, this change placing all cadets in the Pilot class with the exception of six who desired to complete the course as Observers. Sufficient length of time was not available before the change was made to determine how the plan outlined in Memo No. 340 would have worked. A few points in this connection might be noted, however. In the twosquadrons which had to signify a choice of service before the plan was abandoned a large percentage of the cadets preferred the Pilots course in spite of the fact that the course was longer and in spite of the fact that it was explained to each squadron that good, if not the best, men were wanted as Observers. The desire to fly the ship and pilot a scout plane seemed to prevail.

The table below summarizes the preference for service expressed by the two squadrons required to make this statement before the plan was abandoned:

Squadron	Week Ending	Number Preferring to be				Total No. in Sqd.	Quota Established by Washington		
		Pilots	Bombers	Observers	No. Pref.		Pilots	Bombers	Obsers.
D-74	11/16/18	23	4	2	1	30	All Others	4	6
D-74	11/23/18	24	2	2	1	29	All Others	4	8

Such a condition would mean that a large number of candidates would be assigned to the Observers and Bombers Schools against their preference. Furthermore, the ratings on "Special Qualities" and "Previous Education", which were to be determined by personal interviews with the Rating Board would have required a very large amount of time for large squardons. Inasmuch as 75% of the total rating was based on final examination grades, it is questionable whether the time required to make even a hurried estimate of the uncertain factors involved in the other 25% of the rating would have justified the results obtained. A copy of the Rating Board's Report on Squadron D-75 is also included in Appendix F7 to show the form devised at this School for obtaining the requirements. The data on Education and Special Qualities were obtained on other sheets and transferred to this form.

The curriculum as outlined in Stencil No. 272 was never put into effect throughout its entire course due to the signing of the armistice and the manner in which the course was shortened is outlined in a following paragraph.

7. EFFECT OF FREQUENT CHANGES OF CURRICULUM.

It is realized that in order to keep up with rapid developments in aerial warfare which were taking place on the Western Front while the Ground Schools were in operation, frequent revisions of the curriculum were necessary and this School always cooperated gladly in making any changes to better the course of instruction. The clerical and increased instructional work involved in changing from one curriculum to another is immaterial, but too frequent changes in curricula cause confusion and decrease efficiency. Such conditions resulted from the changes in curricula noted below, which followed each other in such short order and this fact was mentioned in the weekly report of the

prevail.

The table below summarizes the preference for service expressed by the two squadrons required to make this statement before the plan was abandoned:

D-75	11/16/18	23	4	2	1	30	Others All	Sqd. Pilots	Bombers	Observers	No.Pref.

Such a condition would mean that a large number of candidates would be assigned to the Observers and Bombers Schools against their preference. Furthermore, the ratings on "Special Qualities" and "Previous Education", which were to be determined by personal interviews with the Rating Board would have required a very large amount of time for large squadrons. Inasmuch as 75% of the total rating was based on final examination grades, it is questionable whether the time required to make even a hurried estimate of the uncertain factors involved in the other 25% of the rating would have justified the results obtained. A copy of the Rating Board's Report on Squadron D-75 is also included in Appendix F7 to show the form devised at this School for obtaining the other sheets and transferred to this form.

The curriculum as outlined in Stencil No. 272 was never put into

7. [illegible]

It is realized that in order to keep up with rapid developments in Schools were in operation, frequent revisions of the curriculum were necessary and this School always cooperated gladly in making any changes to better the course of instruction. The clerical and increased instructional work involved in changing from one curriculum to another is immaterial, but too frequent [illegible] and this fact was mentioned in the weekly report of the

Commandant of April 9, 1918. Some of the problems which become more or less difficult when changes of curricula followed too closely, are: Overload on instructors, lack of time for instructors to revise notes, confusion in keeping record of instruction received by each squadron depending upon which of two or three curricula it is proceeding under, and overload on laboratory and lecture space. In considering the dates below it must be remembered that it takes two or three months (depending upon whether the course is of eight or twelve weeks' length) to change completely from one curricula to another.

Curriculum of June 11, 1917, superseding curriculum of June 5, 1917,
Curriculum of November 1, 1917, superseding curriculum of September 26, 1917,
Curriculum of April 1, 1918, superseding curriculum of March 1, 1918.

8. METHOD OF SCHEDULING INSTRUCTION.

The problem of transferring the work outlined in the various curricula into a daily schedule to be furnished to instructors and cadets grew to be a rather difficult one, especially during periods of change of curricula. It was necessary that this work be done by someone fairly familiar with the work in all departments, who knew the requirements regarding laboratory work, lecture rooms (whether lantern or reflectoscope were necessary), laboratory and lecture room capacities, number of instructors available in each department and in addition cooperate with the University Schedule Committee in order to avoid conflicts with University classes. As an example of the difficulties involved, under the twelve weeks' curriculum the work in Rigging was arranged in such sequence that five squadrons, split in two sections each, rotated in the laboratory in such order as to disassemble and completely assemble an airplane twice a week; in addition the disassembly and assembly work in Engines required five squadrons to appear in definite order each week; also the number of instructors in all departments was limited to the minimum able to carry the work economically and efficiently and it was necessary to exercise care to avoid overloading any department at any one hour. For various reasons it was necessary to make at least a few changes almost every week, each change possibly involving others.

A Schedule Committee was appointed, the Vice-President of the Academic Board, Lieut. Gilbert M. Thomas, Chairman, to look after the schedule each week. A special form was early devised, giving the days of the week and the hours during which instruction was given, with space available for writing the name of the subject and the room in which it was to be given. Seven copies of this schedule were typed each week and distributed as follows:

1 Posted in Aeronautics Laboratory,
1 Posted at Barracks,
1 to Squadron Commanders,
1 to President, Academic Board,
1 to Schedule Committee,
1 to Commandant,
1 to Officer in Charge of Barracks.

Curriculum.

In order that all might be informed of the course of work who should know it, and in order to avoid errors in meeting classes it was found desirable to type the schedule each week making any changes necessary and post the seven copies as noted above.

A copy of the schedule for the week beginning Monday, October 14, 1918, is included in Appendix F8 to show the form used for the schedule and the information conveyed by the schedule. This schedule was the last one based entirely on Stencil 157, as A Squadron of the following week started under Stencil 272.

9. SHORTENED CURRICULUM FOR CLOSING PERIOD.

The curriculum of October 14, 1918, as outlined in Stencil 272 was started on Monday, October 21, 1918, as directed by the Director of Military Aeronautics and at the time of the signing of the armistice this curriculum had been advanced four weeks. On Monday, Nov. 18th, 1918, when the new curriculum was starting on the fifth week, the following telegram was received:

"Washington, D.C., November 18, 1918.

"Aeronautics, Berkeley, Calif.
T - Seventy One Twenty Nine Schools. Cadets now in sixth, seventh, eighth and ninth weeks will be given final examination Military Atudies this week on work covered. Discontinue Signalling course except for observers. Teach pilots Marlin Gun only and no artillery observation. Classes December 7th and 14th will be graduated November 30th necessary final examinations being given. Instruction covering graduation later classes being mailed..... KENLY."

Under date of November 25, 1918; November 29, 1918; and December 4, 1918, the following letters were received, shortening the course for Pilots from 12 to 10 weeks, Observers from 9 to 8 weeks, and Bombers from 8 to 7 weeks. The instructions in these letters were carried out with practically no loss of instruction other than that authorized. This School graduated only one small squadron of Observers and no Bombers.

Under date of December 26, 1918, Memorandum No. 353, copy of which is attached, was received directing that the last squadron be graduated on Saturday, February 1, 1919. This necessitated advancing the graduating date of one squadron one week, which was easily done by eliminating a few hours devoted to Drill and Athletics and substituting instruction in other subjects.

The curriculum of October 14, 1918, as outlined in Stencil 272 could not be advanced from weeks. On Monday, Nov. 18th, 1918, curriculum had been advanced four weeks.

"Washington, D.C., November 18, 1918.

"Aeronautics, Berkeley, Calif.

T - Seventy One Twenty Nine Schools. Cadets now in sixth, seventh, eighth and ninth weeks will be given final examination, eighth and ninth weeks will be given final examination. Discontinue all military training work and work surveys. Discontinue all military training except for observers. Teach pilots Marlin Gun only and no artillery observation. Classes December 7th and 14th will be graduated November 30th necessary final examination. Send pilots. Discontinue all training. Discontinue further instruction. Later place on being ready. .... 12312."

Under date of November 25, 1918; November 29, 1918; and December 4, 1918, the following letters were received, shortening the course for Pilots from 12 to 10 weeks, Observers from 9 to 8 weeks, and Bombers from 8 to 7 weeks. The instructions in these letters were carried out literally no loss of instruction other than that authorized. This School graduated only one small squadron of Observers and no Bombers.

Under date of December 26, 1918, Memorandum No. 355, copy of which is attached, was received directing that the last squadron to be graduated Saturday, February 1, 1919. This necessitated advancing the graduating date of one squadron one week, which was easily done by eliminating a few hours devoted to Drill and Military and Athletic instruction, or other subjects.

Curriculum.

Training Section,
Ground Schools Branch.

November 25, 1918.

The Director of Military Aeronautics.

Commandant, School of Military Aeronautics, University of California, Berkeley, California.

Shortened Course for pilots.

1. The class of December 7th will be graduated on November 30th upon completion of the work in Engines, Airplanes and the Marlin Gun and Ring Sights outlined in Stencil 157. They will not be required to complete the course in Signalling or the course in Observation.

2. The class of December 14th will also be graduated on November 30th upon completing the work specified in paragraph 1.

3. For the succeeding classes under the old curriculum, the course will be shortened to ten weeks. This course will be worked out at your school, observing the requirements specified in paragraph 1.

4. The course for pilots under the curriculum of October 14, 1918, will also be shortened to ten weeks. The first nine weeks of the course as outlined in Stencil 272 will be kept unchanged. The curriculum for the tenth week will be as follows:

(1)	Military	
	Drills	6
(2)	Gunnery	
	Machine Guns	$12\frac{1}{2}$
	Traps	$2\frac{1}{2}$
	Examination	(2)
(3)	Engines	
	Engines running	10
(4)	Observation	
	Coop. Artillery	
	Lectures	1
	Range	4
	TOTAL	38

By direction of Major General Kenly:

D. H. CRISSY
MAJOR, SIGNAL CORPS

1. The class of December 7th will be graduated on November 30th King Sights outlined in Memoir 157. They will not be required to complete the course in Signalling or the course in Observation.

2. The class of December 14th will also be graduated on November 30th upon completing the work specified in paragraph 1.

3. For the succeeding classes under the old curriculum, the course will be shortened to ten weeks. This course will be worked out at your school, observing the requirements specified in paragraph 1.

4. The co[illegible] for pilots under the curriculum of October 14, [illegible] also be si[illegible]

	Gunnery	
	Machine Guns	1
	Traps	[illegible]
	Examination	(2)
(3)	Engines	
	[illegible]	[illegible]
(4)	Observation	
	Gen. Artillery	
	Lectures	1
	.....	1
		[illegible]

By direction of Major General Kenly:

D. H. GRIERSY
MAJOR, SIGNAL CORPS

Curriculum.

Address reply in duplicate to
Director of Military Aeronautics
Washington, D. C.
Training Section
Ground Schools Branch.

WAR DEPARTMENT
Office of the Director of Military Aeronautics.
Washington.

November 29, 1918.

MEMORANDUM No. 349 FOR ALL SCHOOLS.

1. The course for Observers, Corps d'Armee, will be reduced to eight weeks.

2. No instruction in Photo Interpretation will be given in the course for Observers, Corps d'Armee, in the Schools of Military Aeronautics.

3. The requirements in Signalling and Gunnery for this course as laid down in the Curriculum, revised October 14, 1918, Stencil No. 272, will remain unchanged.

4. The curriculum for the first seven weeks of the course will be that outlined in Stencil No. 272; the curriculum for the eighth week will be as follows:

I. Drills	12 Hours
II. Signalling	
Practical	5 "
Radio-Apparatus	2 "
Examination	1 "
III. Gunnery	
Machine Guns	7½ "
Traps	7½ "
Examination	2 "
Total	37 Hours

By direction of Major General Kenly.

D. H. CRISSY
Major, Signal Corps.

Approved:
M. F. Davis,
Colonel, A.S.M.A.
Chief of Training.

WAR DEPARTMENT
Chief of the Director of Military Aeronautics.
Washington.

November 29, 1918.

1. The course in Photo Interpretation will be given in the Corps d'Armee, in the Schools of Military Aeronautics.

2. The requirements in Signalling and Gunnery for this course are laid down in Curriculum, revised October 14, 1918, Stencil No. 272, and need not be repeated.

3. The curriculum for the first seven weeks of the course will be as laid down in Stencil No. 272; the curriculum for the eighth week will be as follows:

I. Drills	12 Hours
II. Signalling	
Practical	3 "
Theoretical	2 "
Demonstrations	1 "
III. Gunnery	
Practical	[illegible]
Theory	[illegible]
Demonstrations	[illegible]

By direction of Major General Kenly.

Approved:
E. L. Zalesski,
Colonel, A.G.D.,
Chief of Training.

Curriculum.

Address reply in duplicate to
Director of Military Aeronautics,
Washington, D. C.
Training Section,
Ground Schools Branch.

WAR DEPARTMENT
Office of the Director of Military Aeronautics.
Washington.

December 4, 1918.

MEMORANDUM NO. 351 FOR ALL SCHOOLS.

1. The course for Bombers will be reduced to seven weeks.

2. The curriculum for the first six weeks of this course will remain unchanged, except for the omission of Bombing in the sixth week. The curriculum for the seventh week will be as follows:

I.	Drills	3 hours
II.	Signalling	
	Practical	5 hours
	Radio-Apparatus	2 "
	Examination	(1)
III.	Gunnery	
	Machine Guns	15 "
	Traps	5 "
	Examination	(2)
IV.	Bombing	
	Lectures	4 "
	Examination	(1)
	Total	38

M. F. DAVIS
Colonel, A. S. (M. A.)
Chief of Training.

By:

D. H. CRISSY,
Major, S. C.
Chief, Ground Schools Branch.

M. F. DAVIS
Colonel, A. S. (M. A.)
Chief of Training.

Curriculum.

Training Section,
Ground Schools Branch.

December 26, 1918.

MEMORANDUM NO. 353 FOR ALL SCHOOLS.

SUBJECT: Shortening of Course.

1. It is directed that you take the necessary steps at once to complete the instruction of all cadets at your School not later than February 1, 1919.

2. It is suggested that this can be done by discontinuing drills and ceremonies on week days for the cadets concerned, and increasing the hours of instruction in other subjects.

3. No further demotions of cadets in classes affected by this order will be made.

4. Cadets not meeting the requirements of the course will be relieved from instruction and discharged or disposed of according to the provisions of proper orders. A written report of the action taken in compliance with paragraph one will be made as early as practicable.

5. The discretion and judgment of the commandant and President of the Academic Board is relied upon to settle the details of the change.

By direction of Major General Kenly:

D. H. Crissy,
Major, Signal Corps,
Chief of Ground Schools Branch.

complaints.

Training Section.
Ground Schools Branch.

Memorandum for the Director.

1. It is directed that you take the necessary steps at once to [illegible] the curtailment of all cadets at your School not later than February 15, 1918.

2. It is suggested that this can be done by discontinuing drills and [illegible] for the cadets concerned, and increasing the hours of [illegible] in other subjects.

3. [illegible] meeting the requirements of the course will be [illegible] and discharged or disposed of according to the [illegible]. [illegible] compliance with paragraph one will be made as early as practicable.

4. The [illegible] of the commencement and [illegible] is left upon to settle the details of the change.

By direction of Major General Kenly:

[illegible],
[illegible], Final Corps,
Chief of Ground Schools Branch.

G. BUILDINGS FOR INSTRUCTION

1. ORIGINAL LABORATORY.

When the representatives of the University of California returned from Toronto on May 16th, 1917, one of the questions demanding most urgent attention was that of a building to house the special equipment such as airplanes, engines, etc. which was to be supplied to the University by the Government. There being no building on the Campus which could be spared from other uses suitable for housing airplanes, it was necessary for the University to erect a building. The work of the School as laid down in the early curriculum providing practically nothing but military instruction for the first three weeks, allowed a little time for the erection of a wooden frame laboratory building before the beginning of technical instruction in the fourth week starting June 11th, 1917. The location of this building was a question requiring some consideration. It was desirable that it be convenient to lecture rooms in other University buildings, that it be located where suitable future expansion was possible and also it was desirable that the building be located near the machine shop in the Mechanics Building. It was decided to place the building in the hollow almost directly in front of the Mechanics Building.

The first building erected (no. 1 on Page 61) a one-story frame structure 60' x 120' was started May 28, 1917, and completed in time for use by the first squadron, who entered the Senior Wing on Monday, June 11, 1917. This building contained a staff office, 2 machine gun laboratories, each capable of holding two tables, 1 floor map for miniature range work, an engine laboratory with space sufficient for mounting 8 engines, a rigging laboratory capable of holding at least two airplanes, and a toolroom. The building provided ample laboratory space for squadrons of 25 men, although in order not to overcrowd the work in Airplanes, the squadrons doing Rigging were always split in two sections. No lecture rooms were originally planned for this building as all lectures could easily be held in nearby University lecture rooms; also no Signalling laboratory was originally included as each cadet was provided with a buzzer and this work was given in the barracks.

2. ADDITIONS.

When definite word was received in the fall of 1917 that the size of the school was to be increased to four or five hundred cadets, work was begun immediately on an extension to the Aeronautics Laboratory. This extension, marked No. 2 in the sketch on page 61 was a two story wooden frame structure 80' x 80'. Provision was made for a second miniature range capable of holding 72 men, 2 machine gun laboratories, an engine laboratory, radio and signalling laboratory, 3 lecture rooms and an extension of the rigging laboratory. This building was completed and in use by November, 1917. Two of the lecture rooms, No. 2 and No. 6, were later taken for laboratories and for the use of the guard. At about the same time, Barracks C. was completed, the lower floor of this building containing a signalling laboratory later arranged to have a capacity of 240 men.

With the inauguration of the twelve weeks' course in March, 1918,

early curriculum providing practically nothing but military instruction for the first three weeks, allowed a little time for the erection of a wooden

convenient to lect

where suitable future expansion was possible and also it was desirable that

was decided to place the building

the Leonardo Building.

The first building erected (no. 1 on Page 6) a one-story frame structure 60' x 120' was started May 28, 1917, and completed in time for use

capable of holding two tables, 1 floor map for miniature range work, an engine laboratory with space sufficient for mounting 8 engines, a rigging laboratory capable of holding at least two airplanes, and a toolroom. The building provided ample laboratory space for squadrons of 25 men, although in order not to overcrowd the work in Airplanes, the squadrons doing Rigging were always split in two sections. No lecture rooms were originally planned for this building as all lectures could easily be held in nearby University lecture rooms; also no Signalling laboratory was originally included as each cadet was provided with a buzzer and this work was given in the barracks.

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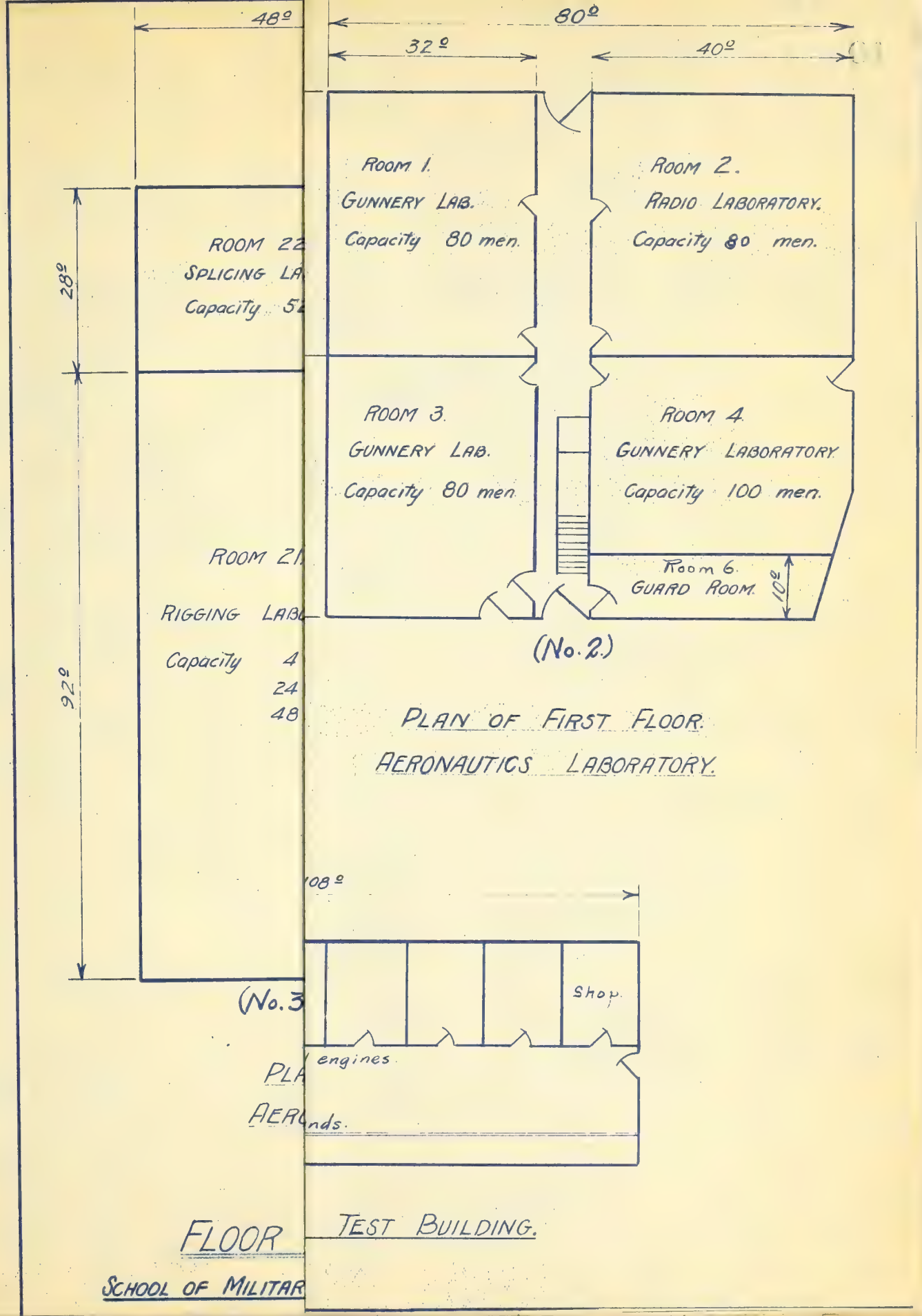
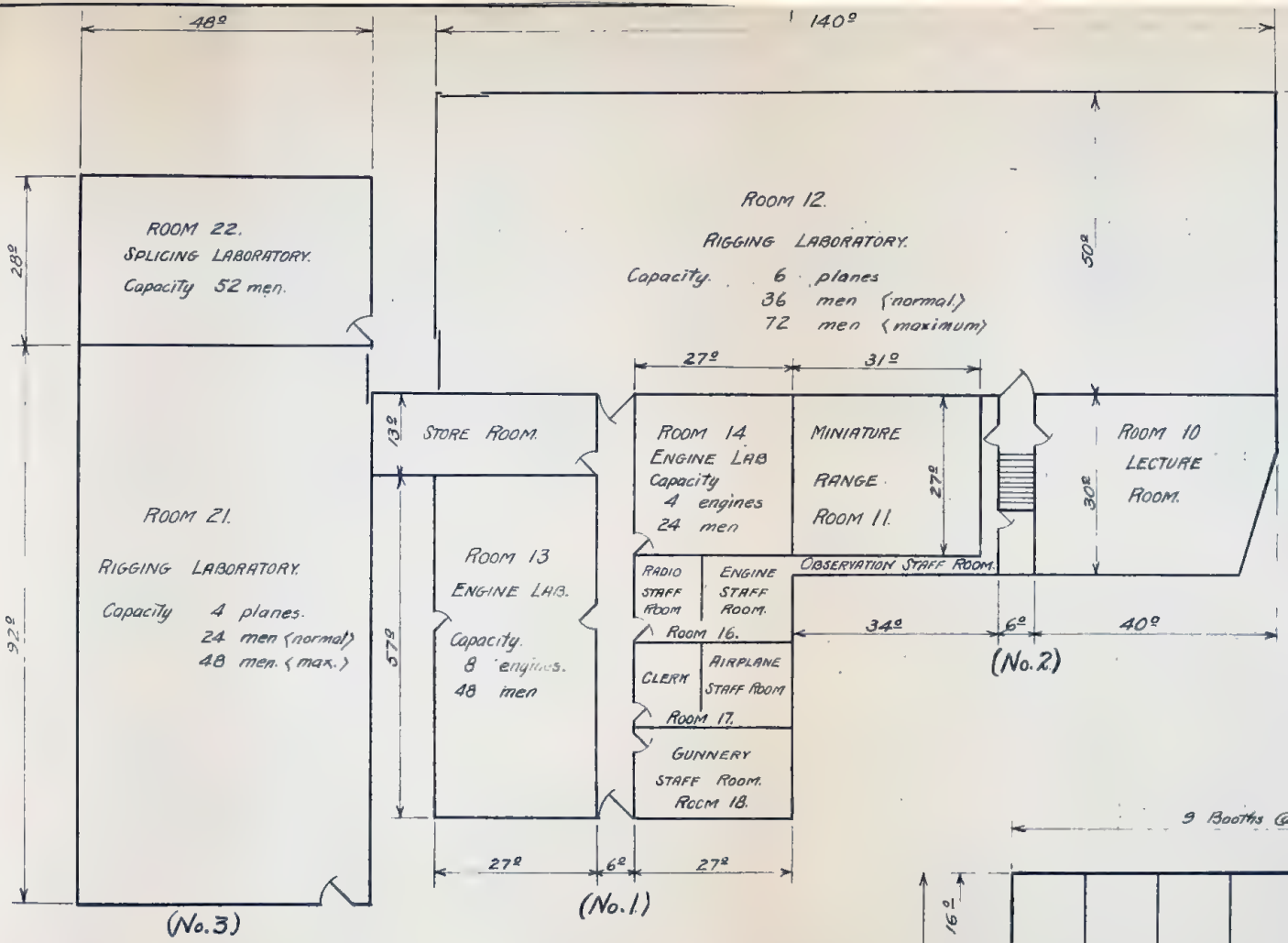
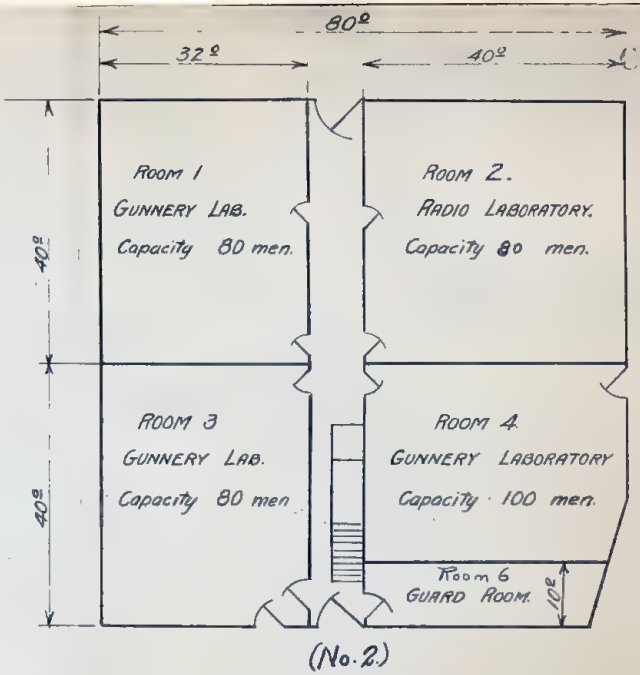
With the inauguration of the twelve weeks' course in March,

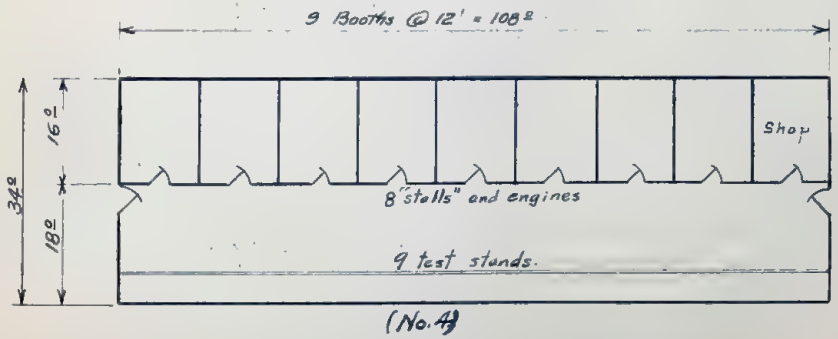

48º
80º
32º
40º
28º
92º
108º
ROOM 22
SPLICING LA
Capacity 52
ROOM 21
RIGGING LAB
Capacity 4
24
48
(No.3
Room 1.
GUNNERY LAB.
Capacity 80 men.
Room 2.
RADIO LABORATORY.
Capacity 80 men.
Room 3.
GUNNERY LAB.
Capacity 80 men.
Room 4.
GUNNERY LABORATORY.
Capacity 100 men.
Room 6.
GUARD ROOM.
10º
(No. 2.)
PLAN OF FIRST FLOOR.
AERONAUTICS LABORATORY.
Shop.
engines
nds.
PLA
AER
FLOOR
TEST BUILDING.
SCHOOL OF MILITAR



PLAN OF SECOND FLOOR
AERONAUTICS LABORATORY.



PLAN OF FIRST FLOOR.
AERONAUTICS LABORATORY.



PLAN OF ENGINE TEST BUILDING.

FLOOR PLANS OF LABORATORIES.

SCHOOL OF MILITARY AERONAUTICS. BERKELEY, CALIFORNIA.

increasing very materially the work in Engines and Airplanes it was necessary to construct an additional engine laboratory and a further extension to the Rigging Laboratory. The Engine Laboratory, shown as No. 4 in the sketch on page 61 , was located within the enclosure surrounding the barracks units which had been constructed on the University Campus. This building provided eight small rooms for disassembly and assembly work, a small machine shop and nine stands for engine running.

The extension to the Rigging Laboratory, shown as No. 3 in the sketch on page 61 , provided space 92' x 48' for an additional Rigging Laboratory capable of holding four airplanes and a Repair Laboratory 28' x 42' for Splicing, Soldering and Patching work, having a capacity of 52 men. The laboratory buildings were heated by means of gas floor furnaces and "Rado" heaters which proved fairly satisfactory for this type of building in this climate.

The last building to be erected for instructional purposes is shown in the sketch on page 63 and for reference numbered 5. This building was erected solely for the rotating map called for in Stencil No. 157 revised curriculum of April 1, 1918. The floor plan was 40' x 40', and the building contained two circular balconies and a rotating map frame 25' in diameter on the lower floor. This building and the rotating map it was to house were carefully planned and much thought and expense was involved in making it satisfactory in its operation. It was never completed, as the signing of the armistice stopped work on this building just as it was nearing completion. The Sketch on page 63 also shows the floor plan of the signalling laboratories located in the barracks.

On pages 61 and 63 of this report are sketches showing the floor plan of the Aeronautics Laboratory Buildings as they existed at the time the School closed. Each room has marked on it the use made of it and the capacity in men and equipment. The use of some of the rooms has varied from time to time during the development of the School, being used first by one department and later, in order to improve laboratory facilities, being transferred to another department. The laboratory capacities are summarized in a later table.

The pictures on pages 64 and 65 show the general arrangement of the Laboratory Buildings. The one on page 64 was the last to be taken and shows the entire group with the exception of the Engine Test Building, which is located with the Campus Barracks and illustrated on page 286 . The buildings are numbered in this picture in accordance with the numbers already referred to above, No. 1 being the original building 60' x 120', built in June 1917; No. 2 the first addition 80' x 80', two-story, built in October, 1917; No. 3, the new Rigging and Repair Laboratory, 48' x 120' built in April 1918, and No. 5 the new rotating map building 40' x 40' just being completed at the time the School closed. The building in the background of this picture was constructed for the School of Radio Electricians and does not belong to the Aeronautics group. The Engine Test Building, No. 4, shown in picture on page 286 , was built in April 1918, having a floor plan 34' x 108'. The picture on page 65 is the same as the one just described except that it was taken prior to the erection of the rotating map building, and

[illegible] Engines and Airplanes it was necessary [illegible] laboratory and a further extension to the [illegible] laboratory, shown as No. 4 in the sketch on [illegible] 63, was located within the enclosure surrounding the barracks units which had been constructed on the University Campus. This building provided eight small rooms for disassembly and assembly work, a small machine shop and nine stands for engine running.

The extension to the Rigging Laboratory, shown as No. 3 in the sketch on page 63, provided space 32' x 46' for an additional Rigging Laboratory capable of holding four airplanes and a Repair Laboratory 28' x 42' for Splicing, Soldering and Patching work, having a capacity of 22 men. The laboratory buildings were heated by means of gas floor furnaces and "Rado" heaters which proved fairly satisfactory for this type of building in this climate.

The last building to be erected for instructional purposes is shown in the sketch on page 63 and for reference numbered 5. This building was erected solely for the rotating map called for in Stencil No. 157 revised curriculum of April 1, 1918. The floor plan was 40' x 40', and the building contained two circular balconies and a rotating map frame 28' in diameter on the lower floor. This building and the rotating map it was to house were carefully planned and much thought and expense was involved in making it satisfactory in its operation. It was never completed, as the signing of the armistice stopped work on this building just as it was nearing completion. The sketch on page 63 also shows the floor plan of the signaling laboratories located in the barracks.

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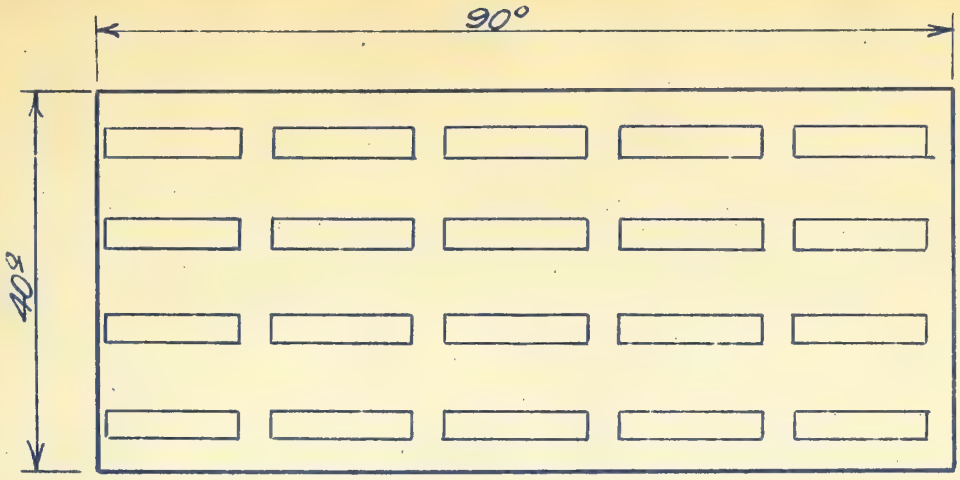
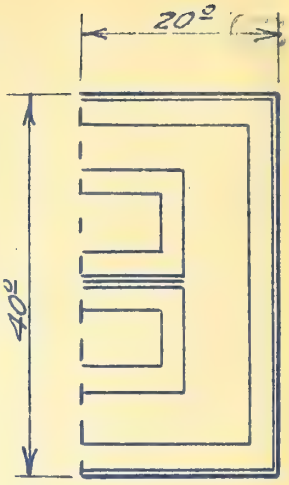
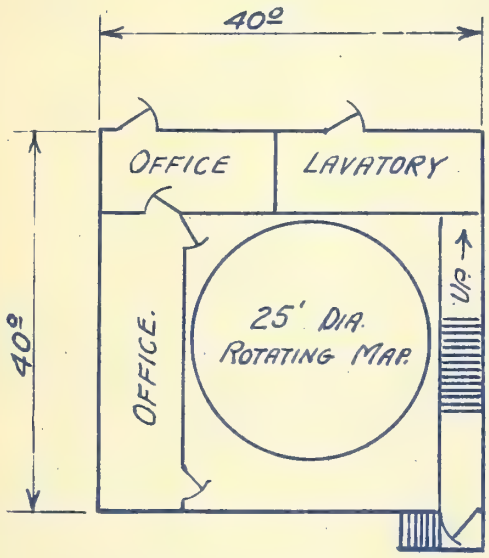


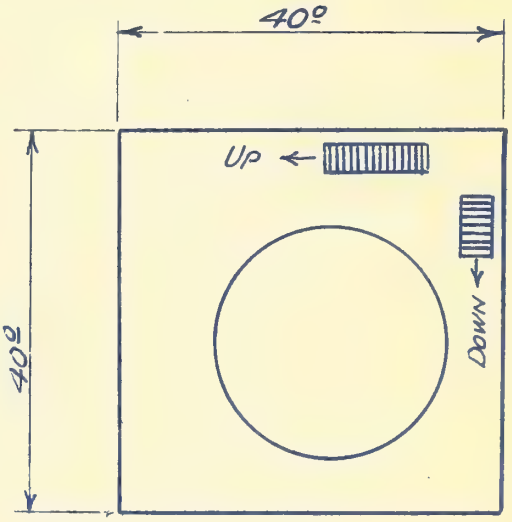
RADIO ROOM. BUILDING C.
Capacity - 3 squadrons of 80 men each.



RADIO ROOM
BUILDINGS E & F. G & H.
Capacity - 70 men each.



FIRST FLOOR



SECOND FLOOR
THIRD FLOOR SIMILAR.

OBSERVATION BUILDING (No. 5)

FLOOR PLAN OF LABORATORIES.

SCHOOL OF MILITARY AERONAUTICS, BERKELEY, CALIFORNIA.


No. 2.
No. 1.
No. 3

Plate No. 2 - Aeronautics Laboratory Building - Latest View

Plate No. 3 - Aeronautics Laboratory Buildings - Prior to completion of Rotating Map Building and showing tents for guards.

also shows the tents used by the guard during the summer months. The picture on page 67 is one of the early views taken of the Aeronautics Laboratory, showing Building No. 1 in the foreground and the addition No. 2 to the right and rear. A partial view of the University Campanile is shown in the background of this picture.

3. LABORATORY CAPACITIES

The capacity of a given laboratory had always to be a somewhat flexible quantity. The attempt was always made to limit the number of cadets per unit of equipment to the number stipulated in the curriculum. Due to the large fluctuations in the size of entering squadrons, however, it was sometimes necessary to crowd somewhat in certain laboratories.

During the early months when the size of the School was approximately 200 cadets and the squadrons were around 25 to 35 cadets and Building No. 1 was the only laboratory space, the capacities could be stated as follows:

Signalling - Buzzer practice in barracks,

Machine Guns - 2 rooms each containing 2 tables, total of 4 guns. Allowing 8 men per gun, capacity 32 men. (The School had been in operation many weeks, however, before 4 guns were received, hence the limiting capacity originally was the number of guns).

Rigging - 2 machines, 6 cadets to a machine, total of 12 cadets. Squadrons doing rigging were always split in 2 sections which gives a minimum capacity of 24 cadets. With 8 cadets to a machine, capacity of 32 could be accomodated.

Engines - Space was provided for 8 engine stands although the School had been in operation many weeks before 8 engines were available. Allowing 6 cadets per engine, capacity of 48.

Miniature Range - Designed for 13 cadets on lower floor and 13 in balcony, total 26. If squadrons were split in two sections 52 cadets could be accommodated.

With the addition of Buildings Nos. 2, 3 and 4, and Signalling Laboratories in the Barracks, and consequent rearrangement of laboratory rooms, the available laboratory capacities were greatly increased. The following table shows the laboratories available for each department at the time the School was at its maximum size during the summer of 1918. These capacities are flexible and in times of great stress temporary arrangements or changes might have been made to relieve some one department, but the figures set down in this table represent conditions very closely as they existed in the summer months of 1918.

[illegible] tents used by the guard during the summer months. The picture on page [illegible] is one of the early views taken of the Aeronautics Laboratory, showing the [illegible] No. 1 in the foreground and the addition No. 2 to the right rear. A partial view of the University Campanile is shown in the background of this picture.

3. LABORATORY CAPACITIES

The capacity of a given laboratory had always to be a somewhat flexible quantity. The attempt was always made to limit the number of cadets per unit of equipment to the number stipulated in the curriculum. Due to the large fluctuations in the size of entering squadrons, however, it was sometimes necessary to crowd somewhat in certain laboratories.

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With the addition of Buildings Nos. 2, 3 and 4, and Signalling laboratories in the Dormitories and [illegible] of laboratory rooms, the available laboratory capacities were greatly increased. The following table shows the laboratories available for each department at the time the School was at its maximum size during the summer of 1918. These capacities are flexible and in times of great stress temporary arrangements or changes might have been made to relieve some one department, but the figures set down in this table represent conditions very closely as they existed in the summer months of 1918.

Plate No. 4 - North side of aeronautics Laboratory Buildings, showing Buildings No. 1 and No. 2 only.

Buildings.

TABLE NO. 2.

Department	Room No.	Dimensions (Feet)	Floor Area (Sq. Feet)	Equipped with No.	Equipped with Articles	No. of Cadets per piece of Equipment Normal	No. of Cadets per piece of Equipment Max.	Capacity Normal	Capacity Max
Military Subjects	No laboratories								
Signalling	2	40x40	1600	80	Keys & Headphones	1	1	80	80
	C.Bar.	40x90	3600	240	Headphones	1	1	240	240
	E.F.G.H. Barracks	Each 40x20	3200	280	"	1	1	280	280
								600	600
Gunnery	1	32x40	1280	10	Tables & Guns	8	10	80	100
	3	32x40	1280	10	do.	8	10	80	100
	4	30x40	1200	12	do.	8	10	96	120
	Outdoor Lab.			20	do.	8	10	160	200
								416	520
Airplanes (Rigging)	12	50x140	7000	6	Airplanes	6	12	36	72
	21	48x92	4416	4	"	6	12	24	48
								60	120
(Repair)	22	28x48	1344	13	Tables	4	4	52	52
(Squadrons doing Rigging and Repair were always slip in two sections, so the above capacities were doubled).									
Engines (Dis.& Assem.)	Eng. Lab.	16x108	1724	8	Engines	6	12	48	96
	14	27x27	729	4	"	6	12	24	48
								72	144
(Car.& Mag.)	13	27x57	1539	8	"Stalls"	6	12	48	96
(Eng.Running)	Eng. Lab.	18x108	1944	9	Stands	6	12	54	108
Observation (Range)	11	27x31 (2 balconies)	828	72	Tables	1	1	72	72

(Squadrons on this miniature range could always be split in two sections if necessary, so the above capacity was doubled).

Table No. 3.

Department	Accr. No.	Dimensions (Area)	Floor area (Sq. feet)	Equipment Sq. feet	Equipment with Accessories	No. of Cadets per class — Accommodation	Access. Area.	Actual	Capacity Sq. ft.
Military Science									
Signalling	2	40x40	1600	80	Keys & Headphones	1	1	80	80
		O.Bar. 40x90	3600	240	Headphones	1	1	240	240
		Barracks 40x20	3200	280	"	1	1	280	280
								600	600
Gunnery	1	32x40	1280	10	Tables & Guns	8	10	80	100
	3	32x40	1280	10	do.	8	10	80	100
	4	30x40	1200	12	do.	8	10	96	120
	Outdoor Lab.			20	do.	8	10	160	200
								416	520
Airplanes (Rigging)	12	50x140	7000	6	Airplanes	6	12	36	72
	21	48x92	4416	4	"	6	12	24	48
								60	120
(Repair)	22	28x48	1344	13	Tables	4	4	52	52

(Gunnery in the Airplane and Engine rooms always slings in two sections, so the above capacities were doubled).

Engines									
(Lib. & Assem.)	Eng. Lab.	16x108	1724	8	Engines	6	12	48	96
	14	27x27	729	4	"	6	12	24	48
								72	144
(Car. & Mag.)	13	27x57	1539	8	"Stalls"	6	12	48	96
(Eng.Running)	Eng. Lab.	12x108	1944	9	Stands	6	12	54	108
Conversion									
(Range)	11	27x31 (2 balconies)	828	72	Tables	1	1	72	72

(Gunnery in this machine room would always be split in two sections if necessary, so the above capacity was doubled).

4. UNIVERSITY LECTURE ROOMS AND SHOPS.

For lectures and examinations the School used the lecture rooms of the University almost entirely, as the Aeronautics Laboratory never contained more than three lecture rooms and for most of the time had only one. The University lecture rooms were well heated and lighted and a number of them contained lanters or reflectoscopes urgently needed in some of the School lectures. The rooms set aside for the use of the School were in buildings conveniently located to the Aeronautics Laboratory and the Barracks.

A large amount of fine shop work has been required for the Gunnery and Observation Departments and the Physics Shop of the University has always been used for this work. The Engines Department (and other departments when necessary) has always had access to the machine shop in the Mechanics Building and a very large amount of work of this character has been carried on. The same can be said of any other shops, buildings or equipment belonging to other Departments of the University, everything was freely placed at the service of the School of Military Aeronautics.

5. PROTECTION OF BUILDINGS.

The buildings have always been carefully guarded, especially at night. In the early months a paid guard was maintained by the University and the buildings were also surrounded by a high barbed wire fence, with electric lights mounted on the fence. When the guard squadron was authorized, a permanent day and night guard consisting of cadets was maintained at the Laboratories and the Barracks. Visitors have always been required to secure passes and when the cadet guard was started, civilian and enlisted instructors were also supplied passes which had to be presented each time upon entering the buildings, these passes having the photograph of the bearer mounted on them. Officers of the Post and cadets wearing their "personal number tag" were admitted without passes. After the signing of the armistice the guard squadron was abandoned in order to shorten the course to its normal length and a paid civilian guard was again maintained by the University until the close of the School. No loss or damage to School property has occurred but it is believed that all precautions taken were highly desirable. Proper fire fighting equipment has always been maintained in all buildings used by the School.

5. PROTECTION OF BUILDINGS.

The buildings have always been carefully guarded, especially at night. In the early months a paid guard was maintained by the University and the buildings were also surrounded by a high barbed wire fence, with electric lights mounted on the fence. When the guard department was abolished, a watchman was employed instead. Nothing of value was left behind at the laboratories and the premises. Janitors were always been required to remain on the premises. Fire extinguishers were provided, sufficient and suitable for the School. No loss or damage to School property has occurred but it is believed that all precautions have been taken against damage. Proper fire fighting equipment has always been maintained in all buildings used by the School.

H -- EQUIPMENT

1. SUPPLIES BY THE GOVERNMENT AND BY THE UNIVERSITY.

The Universities Committee at Toronto recommended to the War Department that the Government supply to the Universities all special equipment necessary for instruction, such as airplanes, motors, machine guns and other equipment of a special nature and not easily procurable by the Universities. The Universities would supply the small equipment necessary for the maintenance and operation of a school, and would also furnish any special equipment which it was necessary to construct at the school. An example of the latter is a miniature range for the work in the Observation Department. This was a piece of equipment of a special nature but which had to be constructed at the school and the University paid for it, charging it to the tuition fund.

The plan outlined above of the Government supplying what might be called special war equipment and the University supplying small articles necessary for the operation of the School has been followed throughout.

A complete list of the material furnished by the Government is not possible in this report and is not necessary. The Government has had, in addition to the Quartermaster stationed at the School, a military storekeeper who was responsible for and has kept track of all Government material received by this School.

2. TOOL ROOM

It was early foreseen that some definite scheme for storing and supplying materials needed for the operation of the School must be furnished. This was accomplished at the School in Berkeley by the installation of a Tool Room in the Aeronautics Laboratory in the early months of operation, and the appointment of a civilian Toom Room Keeper whose sole duty it was to look after the supplies in this room, issuing them to instructors and cadets as needed. The responsibility of the Toom Room Keeper was gradually increased until, in addition to looking after all tools and other equipment used by the School, the issuance of mimeographed syllabi, notes, books, maps and other instructional material to the cadets was turned over to him. This was desirable in order that a complete record of all such equipment out in the hands of cadets could be kept. The method of assigning this equipment to the cadets was as follows:

Upon entering, every man in A Squadron was assigned a personal number and given a button bearing that number which he was to wear as long as attending the Ground School. Six brass tool checks bearing the same number as the cadet to whom issued were also issued to each cadet entering A Squadron. When a piece of equipment, book, map or other article was desired from the Tool Room, a tool check was deposited

2. TOOL ROOM

It was early foreseen that some definite scheme for storing and supplying

with the Tool Room Keeper who had a complete list of names with the personal number of all cadets in the School. When any article was returned to the Toom Room, the check was returned to the cadet and remained in his possession until finally leaving the School. Books, such as the instruction book on the Liberty Motor, the care of which was of special importance, were signed for by every instructor or cadet taking them out. All Government property in the charge of the military storekeeper at the University, when issued to instructors or others, was receipted for. Before obtaining final clearance after graduating or after being relieved from instruction, every cadet was required to present a clearance receipt from the Toom Room showing that he had returned or accounted for all equipment taken out.

3. QUARTERMASTER'S SUPPLIES.

A special storeroom for the storage of Quartermaster's supplies has always been maintained in one of the buildings of the School. In the early months a large storeroom was provided on the first flour of "C" Barracks. When it became necessary to enlarge the mess, this storeroom was moved to the basement of Stiles Hall, a brick building in the immediate vicinity of the barracks, the basement of which was leased by the University. During the summer of 1918, "D" Barracks was converted to administrative offices for the Officers in charge of the barracks, space also being provided in this building for a Quartermaster's Storeroom and for a Post Exchange, although the latter was never put into operation due to the signing of the armistice. All necessary shelving desired by the Quartermaster and all necessary transportation of supplies to and from the railroad station were furnished by the University.

4. EQUIPMENT BY DEPARTMENTS.

Although no attempt has been made in this report to furnish a complete list of equipment used by the School, there is included in the general write-up of each department a statement of equipment which covers in a general way the major part of the equipment used by that department.

I. INSTRUCTORS.

1. HOW EMPLOYED.

According to the term of the contract under which the School of Military Aeronautics operated the University was required to furnish a sufficient number of competent instructors to give lectures, demonstrations and other instruction on the subjects named in the contract. Names of men desired as instructors were recommended to the President of the University by the President of the Academic Board, together with the date of appointment and salary to be paid, and upon approval by the President of the University were added to the staff. The Commandant was consulted regarding additions to the staff and it was his privilege and duty to object to any member of the staff who in his opinion was not a competent instructor. All civilian instructors were required to take the Oath of Allegiance.

2. QUALIFICATIONS REQUIRED.

Previous experience along lines to be taught was desirable, university graduates in engineering or scientific departments preferred; while personality, teaching ability, experience in handling men, good habits and industry were qualities carefully considered although not necessarily in the order herein listed.

It was recommended in letter of June 6, 1917, from the Office of the Chief Signal Officer that for subjects such as Types of Machines, Theory of Flight, Rigging, Cross-country and General Flying and Machine Guns that the University attempt to secure instructors who had had actual experience along the lines indicated. This has been done as much as was feasible and the enlisted men obtained from the flying fields and from gunnery schools have strengthened the staff materially.

However, it was not possible to obtain as many ofthese men as required at the time they were most needed and furthermore they were not always of the type best suited for instructors. The University gradually adopted the plan of employing university graduates in engineering or scientific departments and teaching them the subjects they were to teach. The amount of material an instructor must absorb before being in position to teach what is required under the curriculum in a given branch is relatively small and an engineering graduate with proper application can equip himself for the work quickly, also this type of man is more likely to progress than the average enlisted man. The lack of experienced instructors was keenly felt at times, especially when it was necessary to expand the staff rapidly to meet a large increase in the size of theSchool, but it is believed that the plan adopted has been justified by the well trained nucleus in each department which was maintained in spite of a rapidly changing staff personnell.

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2. QUALIFICATIONS REQUIRED.

Previous experience along lines to be taught was desirable, university graduates in engineering or scientific departments preferred; while personality, teaching ability, resourcefulness in handling men, good health and industry were qualities carefully considered although not necessarily in the order herein listed.

It was recommended in letter of June 6, 1917, from the Office of the Chief Signal Officer that the principle subjects be Types of Machines, Theory of Flight, Rigging, Cross-country and General Flying and Machine Guns that the University attempt to secure instructors who had had actual experience along the lines indicated. This has been done as much as was feasible and the enlisted men obtained from the flying fields and from gunnery schools have strengthened the staff materially.

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Instructors.

3. INSTRUCTION OFINSTRUCTORS.

In the Engines, Signalling and Military Subjects Departments the University was practically always able to obtain experienced men. Men experienced along these lines in civil life were prepared in a very short time to follow out efficiently the work laid down in the curriculum, especially if they happened to be college trained men.

In the Machine Gun Department it was comparatively easy to properly train instructors. Enlisted men from gunnery schools were detailed here and civilian instructors from this School have taken short, intensive courses at gunnery schools, these men then being in a position to materially assist theother gunnery instructors.

Enlisted men were also detailed here for the Airplanes Department and were especially valuable in the Rigging and Repair Laboratories. Instructors from this School made numerous short trips to flying fields, and knowing the problems met with here, these trips were very helpful.

The instructors in Artillery Observation had to prepare themselves almost entirely from the literature received from the Office of the Chief Signal Officer, as until recently it was very difficult to obtain first hand information from any other source.

Any instructor was permitted if he had time available to visit the work of any other department. Very little visiting was done, however, as the constant receipt of new material by each department kept instructors busy revising their notes and lectures.

4. SALARY SCHEDULE.

The salary schedule followed by the University for instructors in the School of Military Aeronautics has been constantly on the increase since the opening of the School. This was necessary in order to keep pace with the salaries being paid in the commercial world for men similarly qualified, and was essential in order to hold instructors at all. The salaries were not high, but were higher than ordinarily paid to university instructors.

When the School first started no very definite salary schedule was in effect, each individual case being considered on its own merits and each man being paid the amount necessary within reasonable limits tosecure his services. Later, particularly after a number of instructors' commissions had been granted, it was necessary to adopt a fairly uniform salary schedule which would place all instructors having the same qualifications on approximately an equal financial basis. Prior to being commissioned, heads of departments as a rule received

3. Instructors in Aeronautics.

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In the Machine Gun Department it was comparatively easy to properly train instructors. Enlisted men from regular regiments were detailed here and civilian instructors from this School have taken short, intensive courses at gunnery schools, these men then going in a position to materially assist another gunnery instructor.

Enlisted men were also detailed here for the Airplane Department and were especially valuable in the flying and repair laboratories. Instructors from this School made numerous short trips to flying fields, and knowing the problems met with here, these trips were very helpful.

The instructors in Military Observation had to prepare themselves almost entirely from the literature received from the offices of the Chief Signal Officer, as until recently it was very difficult to obtain first hand information from any other source.

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Instructors.

$175.00 per month, although in one or two cases where heads of departments also assisted in administrative work this amount was increased. After the instructors' commissions were received a readjustment in salaries was made. A very limited number of commissions being available, they were distributed as follows, each head of department was commissioned (if not already holding a commission) and one man in each department who was regarded as a possibility for head of the department was also commissioned. The salary of the man, second in the department, who was commissioned was raised to approximately $170.00 (2nd Lieut., including commutation for light, heat and quarters), and inasmuch as there were a number of men in each department equally as well qualified to hold this commission some adjustment of salaries was necessary. The maximum salary of the strongest civilian instructor in each department (excluding head of department and other commissioned officers) was fixed at approximately $165.00, other civilian instructors who had been with the School a number of months and were making good were paid $145 to $150 per month and upward revision was made in each case where deserved.

As the salaries paid to instructors vary somewhat between departments it will be discussed briefly by departments, bearing in mind that the salary adjustment outlined in the above paragraph was applied to all departments if merited by men in the department.

In the Military Subjects Department at the opening of the School drill instructors received $50 per month. It was possible to secure University students who had received two or three years instruction in Military Tactics to give this work on part time. Later it was necessary to increase this to $65 and $75 per month and when these men were put on full time their pay was raised to $110 - $125. Men giving the lecture work in the Military Subjects Department were ordinarily paid from $110 - $125.

In the Radio and Signalling Department it was possible to secure properly qualified men at a salary of $100 - $110. It was later necessary to increase the salary of these men from $125 to $140.

In the Gunnery Department due to the large amount of laboratory work which did not require as highly qualified men as were needed in some of the other departments it was possible for a long time to secure men at $100 - $110 per month. In the gradual revision upwards, however, and after these men had served with the school for some time their pay was raised to $125 - $140 per month.

In the Airplanes Department it was necessary from the start to pay slightly higher salaries due to the more technical nature of the work qhich required men of slightly higher ability. The men in this department were ordinarily started at $125 per month and were later increased to $140 - $165.

Instructors.

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In the Work and Signalling Department it was possible to secure competent qualified men at a salary of $100 - $110. It was later necessary to increase the salary of these men from $125 to $140.

In the Gunnery Department due to the large amount of laboratory work which did not require as highly qualified men as were needed in some of the other departments it was possible for a long time to secure men at $100 - $110 per month. In the gradual revision upwards, however, and after these men had served with the school for some time their pay was raised to $125 - $140 per month.

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Instructors.

In the Engines Department a slightly higher scale was maintained than in the other departments. It was possible to secure some good men in the early months of the school at salaries of $125 - $135. Later, however, these men were raised to $150 and it was necessary in the past few months to start instructors at this amount in order to get properly qualified men for the Engines Department.

In the Observation Department the salary range was from $125 to $150.

The following table shows the average pay of instructors by months during the year 1918 by departments. This table includes the salary of the head of the department whether commissioned or civilian (during the later months of the year all heads of departments were commissioned), includes the pay of enlisted instructors at the total compensation received from the Government and from the University, but does not include any officers in the department other than the head of the department. During the later months possibly one additional instructor in each department was commissioned, but the inclusion or exclusion of his salary would not materially affect the table below as the figures there included are fairly approximate and are furnished for comparison only. Enlisted instructors serving at the School, where properly qualified, were paid at the same rate as civilians, the difference between the pay received from the Government (including allotments) and the pay the instructors would have received as a civilian being made up by the University.

TABLE NO. 3.

AVERAGE MONTHLY SALARIES OF INSTRUCTORS BY DEPARTMENTS-Year 1918.
(Read explanation above.)

Year 1 9 1 8	Mil. Sub.	Sig.	Gun.	Air-planes	En-gines	Obs.	Aids to Flight
January	$94	$129	$130	$135	$140	$145	$133
February	94	125	127	141	140	140	133
March	100	124	126	140	140	137	-
April	105	128	127	140	140	135	-
May	100	129	122	146	139	135	-
June	112	128	122	139	139	135	-

Instructors.

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(Read explanation above.)

Year 1 9 1 8	Mil. Sub.	Sig.	Gun.	Air-plane	Engine	Obs.	Ide. & Tilight
January	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
February	94	125	127	141	140	140	133
March	100	124	126	140	140	137	-
April	[illegible]	[illegible]	127	140	140	135	-
May	100	125	128	146	139	135	-
June	112	128	122	139	139	135	-

Instructors.

TABLE NO. 3 (Continued.)

AVERAGE MONTHLY SALARIES OF INSTRUCTORS BY DEPARTMENTS - YEAR 1918.

Year 1 9 1 8	Mil. Sub.	Sign.	Gun.	Air-planes	En-gines	Obs.	Aids to Flight
July	$105	$120	$127	$143	$146	$136	-
August	104	127	129	144	145	134	-
September	120	129	131	143	146	142	-
October	126	137	138	150	147	147	-
November	131	137	141	151	150	148	-
December	144	-	134	157	154	153	-
Average	111	128	130	144	144	140	133

5. HOURS OF WORK.

The amount of time required of the instructors varied during different periods of operation of the School and also varied somewhat between departments. The nature of the work required that the instructor should be constantly striving to improve his lectures and methods of instruction and incorporate new material when received from the Office of the Chief Signal Officer. Instructors were encouraged to devote any spare time to parallel reading along the lines of this work and to study of methods and devices for improvement of instruction. The attempt was made to limit instruction hours to 30 to 35 hours per week, including grading of papers, although at times this was greatly exceeded for short periods due to overloads caused by changes in curriculum, sickness in the department etc.

6. VACATIONS.

It was recommended by the office of the Chief Signal Officer that instructors be allowed frequent vacations so that the constant repetition of the work week after week would not become too monotonous. This School adopted the policy of allowing two weeks vacation for every six months of service. This policy was adopted in December 1917 and has been effective since that time.

TABLE No. 1 (continued.)

AVERAGE MONTHLY SALARIES OF INSTRUCTORS BY DEPARTMENTS - YEAR 1918.

Year 1918	Mil. Tech.	Elec.	Gun.	Gunnery	Air-plane	Bu-ones	Aides to Flight
July	[illegible]	[illegible]	127	[illegible]	[illegible]	[illegible]	-
August	104	127	129	144	145	144	-
September	120	120	131	143	146	142	-
October	126	124	135	140	147	147	-
November	127	[illegible]	141	142	140	148	-
December	144	-	134	137	134	138	-
Average	121	116	130	144	142	140	122

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Instructors.

7. UNIFORMS.

The question of uniforms for civilian instructors was never seriously considered by the staff of this School and any such plan was disapproved by the Office of the Chief Signal Officer under date of October 18, 1917. A distinctive pin was adopted by the staff in the early months of 1918 and was worn by civilian instructors who cared to do so.

8. ORGANIZATION.

The organization of the staff was effected more along departmental lines than as an entire body. Staff meetings at which the President of the Academic Board presided were held frequently however (every week or every two weeks), giving the instructors of one department a chance to get acquainted with instructors in other departments. At these meetings the work of each department was discussed in turn by members of the staff, and when the opportunity offered, officers or others outside of the School who were connected with war work were asked to address these meetings.

The most effective organization of the staff as noted above was the departmental organization, which was necessary in the case of the larger departments in order to properly subdivide and effectively carry on the work. The staff organization of each department is discussed in some detail in the write-up of each department under the head of Instruction, a good sample of departmental organization being given in the Airplanes Department.

9. DRAFT STATUS.

A large majority of the instructors in this School have been of draft age (21 to 31), and this fact has made the instructor problem rather difficult to meet. It was not financially possible for the University to employ competent men who were over the draft age. Desirable technical men who have passed 31 years of age command such salaries as to make their consideration impossible and while there were no doubt many men over draft age who would willingly have served at a sacrifice it would not have been feasible to assemble a large number in the limited time available. Moreover, it is believed that younger men are in position to better adapt themselves to the rapid changes in methods of instruction required at schools of this type. Of the small number of older men tried out as instructors here practically none were successful. It has been possible to obtain men of draft age at a reasonable salary but it has been very difficult to hold them,-first, because of the action of the draft law, and second, because of a desire for more active service.

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Instructors.

During the early months of the war, Exemption Boards granted deferred classification to instructors upon presentation of affidavits from the Commandant stating that they were instructors. Later ruling refused to allow deferred classification to instructors. In December 1917 arrangements were made by the Office of the Chief Signal Officer for enlisting instructors in the Signal Enlisted Reserve Corps allowing them to remain on inactive duty. Twenty-five instructors took this step and these instructors were never called to active duty except upon their own request and with the consent of the School. Arrangements were made later whereby instructors called could be inducted as privates and assigned to duty here as instructors and this served as a means of holding a number of men who otherwise would have been sent elsewhere.

The question of instructors' commissions has already been mentioned above. Three heads of departments were commissioned in September, 1917; of these three men, two were later transferred. During August and September, 1918; ten instructors' commissions were granted to men in this School which served in a measure to quiet the feeling of restlessness which had been growing up to that time.

While the difficulty of obtaining instructors has been recognized and has been mentioned repeatedly in the weekly reports of the Commandant as early as Sept. 1917, it has not been the policy of the Commandant or President of the Academic Board to stand in the way of any instructor, civilian, enlisted or commissioned, who desired to transfer to more active service if it were at all possible to spare his services, and on account of this the School has lost from time to time a number of its strongest men.

10. PERSONNEL.

When the School opened on May 21, 1917, the curriculum then being followed was divided into a Junior Wing and a Senior Wing. The Junior Wing (three weeks) was devoted almost entirely to drill and lectures on military subjects which allowed time for the University to obtain and train instructors in the more technical departments whose work started in the fourth week beginning June 11, 1917. On May 21, 1917, the staff consisted of the three members of the commission to Toronto. One instructor in calisthenics and three drill instructors were obtained at once. On May 28, 1917, it was estimated that twenty-five instructors would be required to handle the work of the entire School as laid down in the curriculum then on hand, these instructors to be taken on as needed. The following table is of general interest showing as it does the early staff of the School as approved by the President of the University up to June 15, 1917, giving the date of appointment and the department in which instruction was to be given.

INSTRUCTORS.

During the early months of the war, Exemption Boards granted deferred classification to instructors upon presentation of affidavits from the Commandant stating that they were instructors. Later ruling refused to allow deferred classification to instructors. In December 1917 arrangements were made by the Office of the Chief Signal Officer for enlisting instructors in the Signal Enlisted Reserve Corps allowing them to remain on inactive duty. Twenty-five instructors took this step and these instructors were never called to active duty except upon their own request and with the consent of the School. Arrangements were made later whereby instructors called could be inducted as privates and assigned to duty here as instructors and this served as a means of holding a number of men who otherwise would have been sent elsewhere.

The question of instructors' commissions has already been mentioned above. Three heads of departments were commissioned in September, 1917; of these three men, two were later transferred. During August and September, 1918, ten instructors' commissions were granted to men in this School which served in a measure to quiet the feeling of restlessness which had been growing up to that time.

While the difficulty of obtaining instructors has been recognized and has been mentioned repeatedly in the weekly reports of the Commandant as early as Sept. 1917, it has not been the policy of the Commandant or President of the Academic Board to stand in the way of any instructor, civilian, enlisted or commissioned, who desired to transfer to more active service if it were at all possible to spare his services, and on account of this the School has lost from time to time a number of its strongest men.

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Instructors.

TABLE NO. 4.

EARLY STAFF- SCHOOL OF MILITARY AERONAUTICS.

B. M. Woods.	May 3, 1917.	President of the Academic Board.
B. F. Raber.	May 3, 1917.	Professor of Aeronautical Engineering.
L. T. Jones.	May 3, 1917.	Machine Guns.
F. W. Cozens.	May 22, 1917.	Physical Education.
G. A. Harrison	May 22, 1917.	Military Tactics.
E. F. Steen.	May 22, 1917.	Military Tactics.
E. S. Pillsbury.	May 22, 1917.	Military Tactics.
R. B. McPherson.	May 28, 1917.	Wireless and Signalling.
M. E. Gibson.	May 28, 1917.	Military Tactics.
E. N. D'Oyly	June 4, 1917.	Art. Obs. & Miniature Range.
H. M. Jeffers	June 4, 1917.	Astronomy & Meteorology.
F. H. Bachman.	June 4, 1917.	Engines.
H. O. Russell	June 4, 1917.	Machine Guns.
M. R. Clark	June 5, 1917.	Military Tactics.
W. D. Waterman	June 11, 1917.	Aeroplanes.
F. S. Stockton	June 11, 1917.	Machine Guns.
G. R. McDonald	June 11, 1917.	Machine Guns.
D. J. Conant	July 1, 1917.	Engines.
D. B. Macfarlane	July 1, 1917	Engines.

Attached to this report as Appendix II is a complete list of all instructors who have served in this School arranged alphabetically by departments, showing the name, date of appointment, status, previous experience, date of leaving and cause of leaving. The information contained in this appendix is summarized in following paragraphs.

The following table taken from the S.M.A. payroll shows the maximum number of instructors who served in each department, by months for the year 1918. This table includes the head of the department but includes no other officer in the department (for a part of the time there was on additional officer in each department), and does not include six or eight officers who devoted a few hours to lectures in the Military Subjects Department (Post Surgeon and assistants) nor does it include the instructors in Calisthenics and Sports, and disciplinary officers in charge of the Barracks. In order to show some relation between the number of instructors and the number of cadets, the table below shows the average number and maximum number of cadets in the School during the same period. The number of instructors in every department does not vary directly with the School enrollment of course, but this table shows the general relation.

TABLE NO. 4.

[illegible]

B. M. Woods.	May 5, 1917.	President of the Academic Board.
E. [illegible]	[illegible], 1917.	[illegible]
[illegible]	[illegible], 1917.	[illegible]
F. W. Owens.	May 22, 1917.	Physical Education.
O. A. [illegible]	[illegible], 1917.	Military Tactics.
E. F. Steen.	May 22, 1917.	Military Tactics.
E. S. Pillsbury.	May 22, 1917.	Military Tactics.
R. B. McPherson.	May 28, 1917.	Wireless and Signalling.
M. E. Gibson.	May 28, 1917.	Military Tactics.
E. M. O'Cyly	[illegible], 1917.	Arc. Che. & Chemistry [illegible].
H. M. Jeffers	June 4, 1917.	Astronomy & Meteorology.
E. E. [illegible]	June 4, 1917.	[illegible]
H. C. [illegible]	June 4, 1917.	Machine Guns.
[illegible]	June 4, 1917.	Military Tactics.
W. D. Waterman	June 11, 1917.	Aeroplanes.
F. S. Stockton	June 11, 1917.	Machine Guns.
G. R. McDonald	June 11, 1917.	Machine Guns.
[illegible]	June 1, 1917.	[illegible]
D. E. [illegible]	[illegible], 1917.	[illegible]

Attached to this report as Appendix II is a complete list of all instructors who have served in this School arranged alphabetically by departments, showing the name, date of appointment, status, previous experience, date of leaving and cause of leaving. The information contained in this appendix is summarized in following paragraphs.

The following table taken from the S.M.A. payroll shows the maximum number of instructors who served in each department, by months for the year 1918. This table includes the head of the department but includes no other officer in the department (for a part of the time there was an additional officer in each department), and does not include six or eight officers who devoted a few hours to lectures in the Military Science Department (Med. Surgeon and assistants) nor does it include the instructors in Athletics and Sports, and disciplinary officers in charge of the Barracks. In order to show some relation between the number of instructors and the number of cadets, the table below shows the average number and maximum number of cadets in the School during the same period. The number of instructors in every department does not vary directly with the School enrollment of course, but this table shows the general relation.

Instructors.

TABLE NO. 5.

MAXIMUM NUMBER OF INSTRUCTORS BY DEPARTMENTS BY MONTHS- YEAR 1918

AND AVERAGE AND MAXIMUM NUMBER OF CADETS.
(See explanation above.)

	Maximum Number of Instructors									
Year 1918	Mil. Sub.	Sig.	Gun.	Airpl	Eng.	Obs.	Aids to Flight	Total	Aver. No. Cadets in School	Maxim. No. Cadets in School
January	11	7	13	7	10	3	3	57	604	702
February	11	9	12	7	12	5	3	59	663	685
March	11	10	17	8	12	6	-	64	613	624
April	12	9	17	10	11	5	-	64	560	599
May	13	10	18	9	15	5	-	70	557	642
June	13	9	22	14	17	5	-	80	740	783
July	12	12	23	14	19	7	-	87	911	940
August	12	10	17	14	19	8	-	80	795	889
September	8	9	18	13	16	8	-	72	604	686
October	7	8	14	10	15	6	-	60	388	452
November	6	8	14	10	14	8	-	60	352	400
December	4	2	7	6	7	3	-	29	129	181

Instructors.

In order to show the change in personnel of the staff by departments the following table compares by departments the maximum size of each departmental staff from the table above with the total number who have served in each department taken from Appendix II .

TABLE NO. 6.

MAXIMUM NUMBER OF INSTRUCTORS ON DUTY AT ANY ONE TIME AND TOTAL NUMBER WHO HAVE SERVED THROUGHOUT THE ENTIRE PERIOD OF OPERATION, BY DEPARTMENTS.

Number of Instructors													
All Depts.		Mil. Subjects		Sig.		Gunnery		Airplanes		Engines		Observ.	
Max.	Total	Max.	Total	Max.	Total	Max.	Total	Max.	Tot'l	Max.	Tot'l	Max	Tot'l
87	145	13	32	12	14	23	40	14	18	19	29	8	16

The high rate of "turn-over" in the Military Subjects Department was due to the employment of student drill instructors who served for short periods only; in the Gunnery Department apparently the high rate of "turn-over" was due to the employment on a temporary basis of men who were awaiting call to the School and who served a short time only.

11. STATUS, EDUCATION AND PREVIOUS EXPERIENCE.

The status of theinstructors serving in this School has been one of the difficult problems for the University. The University preferred to use civilian instructors. As noted above, however, a large majority ofinstructors were subject to draft and it was not always possible for them to maintain their civilian status. Due to this fact, and due to the fact that enlisted men were sent here to serve as instructors, the staff finally was made up of men who might be classed under the following heads:

Civilian during entire service.
Civilian, later enlisted in the S.E.R.C.(Non-active).
Civilian, later inducted as privates in the Air Service.
Officer during entire period of service.
Enlisted men detailed to the school.
Civilian instructors who were later commissioned.

instructors.

In order to show the change in personnel of the staff by departments the following [illegible] by departments the maximum size of each departmental staff [illegible] above with the total number who have served in each department [illegible] Table II.

[illegible] NO. 6.

[illegible] INSTRUCTORS ON DUTY AT ANY ONE TIME AND TOTAL [illegible] THE ENTIRE PERIOD OF OPERATION, BY [illegible]

All Depts.	Mil. Subjects Dept.	Gunnery Dept.	Engineering Dept.	Observer Dept.
	Number of Instructors			
	Max.	Total	Max.	Total	Max.	Total	Max.	Total
57	120	12	56	19	44	13	40	12	34	11	25	9	22

The high rate of "turn-over" in the Military Subjects Department was due to the [illegible] of student [illegible] served for short periods only; in the Gunnery Department apparently the high rate of "turn-over" was due to the employment on [illegible] basis of men who were [illegible] and who served a short time only.

II. [illegible]

The status of thoinstructors serving in this School has been one of the difficult problems for the University. The University preferred to use civilian instructors. [illegible] However, [illegible] civilian instructors were subject to draft and it was not always possible for them to maintain their civilian status. Due to this fact, and due to the fact that enlisted men were sent here to serve as instructors, the staff finally was made up of men who might be classed under the following heads:

Civilian serving entire service.
Civilian, later enlisted in the S.E.R.C. (Non-active).
Civilian, later inducted as privates in the Air Service.
Officer during entire period of service.
Enlisted men detailed to the school.
Civilian instructors who were later commissioned.

Instructors.

As noted earlier in this report the University preferred to use as instructors university graduates in technical lines, and approximately 50% of the staff were so qualified. In addition, about 27% of the instructors had taken special instructional work directly along the lines they taught or in lines very similar, the balance of the staff being university undergraduates of from one to three years standing.

Most of the university graduates who served as instructors were graduates in technical departments and had previous engineering experience before coming to the School. Quite a large number of instructors, had had previous experience along lines which particularly qualified for instructing in the departments in which they were employed.

The table on the following page summarizes the data contained in Appendix II on the status, education and previous experience of the instructors who have served in this School. It may be noted in this table, under Previous Experience, only three men are listed as having had experience as instructors. A number of men classified under other heads had had some teaching experience, but a large number of instructors had their first teaching experience in the School of Military Aeronautics, and although they may have deviated from approved rules of Pedagogy, they were nevertheless successful in their work as instructors in a school of this type.

Instructors.

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Most of the university graduates who served as instructors were graduates in technical departments and had previous engineering experience before coming to the School. Quite a large number of instructors, had had previous experience along lines which particularly qualified for instructing in the departments in which they were employed.

The table on the following page summarizes the data contained in supplementary form in the charts, showing the previous experience of the instructors who served in this School. It may be noted in this table, under Previous Experience, only those who are listed as having had experience as instructors. A number of men classified under other heads had had some teaching experience, but a large number of instructors had their first teaching experience in the Signal Corps Military Government, and although they may have developed from an proved value of instructors, they were nevertheless essential in their work as instructors in a school of this type.

TABLE NO. 7.

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Summary of Status, Education and Previous Experience

	Mil. Sub.	Sig.	Gun.	Airpl	Eng	Obs	Aids to Flight	Totals	Deduct names in more than one Dept	Net Totals
Status										
Civilian During entire service	17	9	23	11	19	8	1	88	1	87
Civilian-Enl.S.E.R.C. Non-active	-	2	4	1	4	2	1	14	2	12
Civilian-later as enlisted man	1	-	3	1	4	-		9	-	9
Civilian-later as officer	7	2	3	2	2	5	4	25	6	19
Enlisted man during entire service	2	1	7	3	-	1	1	15	2	13
Officer during entire service	5	-	-	-	-	-		5	-	5
Totals	32	14	40	18	29	16	7	156	11	145
Previous Education										
University graduates	10	2	25	10	14	13	4	78	6	72
University students, 1-3 years	19	5	5	3	3	-	2	37	3	34
Miscellaneous-High School-Radio Schools-Gunnery Schools, Auto Schools, etc.	3	7	10	5	12	3	1	41	2	39
Totals	32	14	40	18	29	16	7	156	11	145
Previous Experience										
Univ. Grad. in Engineering or Sciences with practical experience	3	2	18	9	14	13	4	63	6	57
Univ. Grad. in Letters and Law	4		7	1				12	-	12
Univ. Grad. Medical	3							3	-	3
University Student	19		5	3			2	29	3	26
Instructor	1		1	1				3	-	3
Radio Mechanics & Operators		10				1		11	1	10
Practical Engineering		2	2	1	8	1		14	-	14
Gunnery School Course			5					5	-	5
Airplane Builder				2				2	-	2
Airplane Mechanic				1				1	-	1
Practical Auto Experience					7			7	-	7
Photographer						1	1	2	1	1
Miscellaneous	2		2					4	-	4
Totals	32	14	40	18	29	16	7	156	11	145

SCHOOL OF MILITARY AERONAUTICS -- DECEMBER

Staff Personnel -- Summary of Status, Education and Previous Experience

	Ill.	Sig.	Cav.	Inf.	Coast Arty.	Field Arty.	Air Service	Medical Corps	Dental Corps	Chem. Warf. Serv.	Total
Status											
Civilian during entire service	17	2	22	11	14	6	1	56	2	2	67
Civilian-Rel.S.N.R.O. Non-active	-	2	4	1	4	2	1	14	2	2	18
Civilian-later as enlisted man	1	-	2	1	4	-		3	-	-	3
Civilian-later as officer	7	2	3	2	4	2	4	23	2	2	27
Enlisted man during entire service	1	1	7	7	4	1	2	11	2	2	15
Officer during entire service	3	4	-	-	-	-		7	-	-	7
Total	29	19	40	22	32	11	7	114	11	8	137
Previous Education											
University graduates	10	2	26	10	14	10	4	76	6	6	82
University students, 1-3 years	12	5	6	2	3	-		27	1	1	28
Miscellaneous-High School-Radio											
Schools-Commerce Schools, Radio											
Schools, etc.	5	7	10	5	12	3	3	43	3	1	49
Totals	32	14	40	18	29	13	7	156	11	8	165
Previous Experience											
Univ. Grad. in Engineering or Science with practical experience	3	2	18	8	14	13	4	55	6	6	67
Univ. Grad. in Letters and Law	4		7	1				12	-	-	12
Univ. Grad. Medical	3							3	-	-	3
University Student	19		5	3			2	29	1	1	30
Inspector	1		1	1				3	-	-	3
Radio Mechanics & Operators		10				1		11	1	1	12
Practical Engineering		2	1	3	5	1		12	-	-	12
Commerce School Course		5						5	-	-	5
Airplane Builder				2				2	-	-	2
Airplane Mechanic				1				1	-	-	1
Practical Auto Experience					7			7	-	-	7
Photographer						1	1	2	1	1	3
Miscellaneous	2		2					4	-	-	4
Totals	32	14	40	18	29	13	7	156	11	8	167

Instructors.

12. AVERAGE LENGTH OF SERVICE.

Several factors have affected the average length of service of instructors in the School of Military Aeronautics. The comparatively small size of the School for several months required a comparatively small staff, when the size of the School was increased it was necessary to increase the staff and later the staff was necessarily decreased to some extent when the School decreased in size. A great many instructors have resigned from the staff in order to get into more active service and several others who were commissioned were transferred. In looking over the" Cause for Leaving" in Appendix Il very few cases of "discharged" will be found. Two or three instructors were discharged for incompetence, one or two for suspected disloyalty but probably not over six were discharged for reasons other than necessary reduction in size of the staff or closing of the School. Table No. 8 on the following page shows by departments the number of instructors serving each number of months from one to twenty. From this table the average length of service is seen to be 7.7 months which is very satisfactory considering the unavoidable factors which made changes in staff necessary. Thirty-six instructors were with the School for a year or longer which shows that a good nucleus of instructors has always been maintained. Nevertheless it may be seen that the efficiency of a School of this type could be increased materially if the size could be so regulated and other factors so arranged that the personnel of the staff did not change so rapidly.

instructors.

14. Effect of Size of Staff.

Several factors have affected the average length of service of instructors in the Normal or Military Academy respectively. The comparatively small size of the School for several months required a comparatively small staff, when the size of the School was increased it was necessary to increase the staff and later the staff was materially decreased to some extent when the School decreased in size. A great many instructors have resigned from the staff in order to get into more active service and several officers who were commissioned were promoted. In fact, every one has resigned in order to get into active service, in many cases of "disgrace" will be found. In no case instructors were discharged for incompetency, and in the few avowedly disloyal but probably not even six were discharged for reasons other than necessary reduction in size of the staff or closing of the School. Table No. 8 on the following page shows by departments the number of instructors serving each number of months from one to twenty. From this table the average length of service is seen to be 7.7 months which is very satisfactory considering the unavoidable factors which made changes in staff necessary. Thirty-six instructors were with the School for a period of longer which shows that a good nucleus of instructors has always been maintained. Nevertheless it may be seen that an estimate of a school of this type could be increased materially if the size could be so regulated and other factors so arranged that the personnel of the staff did not change so rapidly.

TABLE No. 8.

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Average Length of Service of Instructors

Period of Service Months	Number of Instructors: Mil. Sub.	Sig.	Gun.	Airpl	Eng.	Obs.	Aids to Flight	Totals	Deduct names in more than One Dept.	Totals
1	5		5		4	1		15	-	15
2	3		3	1	2	1		10	-	10
3	1		2	1	4	3		11	-	11
4		1	7	2		1		11	1	10
5	4	2	4	2				12	-	12
6	2	3		1	4		1	11	-	11
7	3		4	1	2	2		12	-	12
8	1				2		1	4	1	3
9		1	3	1	2			7	1	6
10	2	1	2	2		2	1	10	1	9
11	1	2	3	1	2	1	1	11	1	10
12	5		4	1	2	1		13	1	12
13		1		2	2	1		6	-	6
14			1	1				2	-	2
15	1		1		1	1	1	5	2	3
16	1	2	1					4	-	4
17								-	-	-
18	2			2	1	2	2	9	3	6
19					1			1	-	1
20	1	1						2	-	2
Totals	32	14	40	18	29	16	7	156	11	145
Average Period of Service--Months	7.8	9.8	6.6	9.1	7.4	8.6				7.7

Table No. 3.

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Average Length of Service of Instructors

Period of Service in Months	Number of Instructors: Sig.	Inf.	Air	Exp.	Sig.	Flight	Total	Made one Deal.	Made more than one Deal.	Total
1	3		5		4	1	14		-	14
2	3		3	1	2	1	10		-	10
3			3	1	4	3	11		-	11
4		1	7	2		1	11		1	12
5	4	2	4	2			12		-	12
6	3	3		1	4		11	1	-	12
7	3		4	1	2	2	12		-	12
8	1				2		4	1	1	6
9		1	3	1	2		7		1	8
10	3	1	3	2		2	20	1	1	9
11	1	2	3	1	2	1	11	1	1	10
12	5		3	1	2	1	12	1	1	12
13		1		2	2	1	6		-	6
14			1	1			3		-	3
15	1		1		1	1	5	1	2	5
16	1	2	1				4		-	4
17							-		-	-
18	1			2	1	2	6	3	3	6
19					1		1		-	1
20	1	1					2		-	2
Totals	12	14	40	18	24	10	106	7	11	108
Average Period of Service-months	7.8	9.8	6.6	9.1	7.4	8.6				7.7

I. INSTRUCTION

1. NATURE OF WORK.

The work of the School of Military Aeronautics when first started was entirely new to the men who were to undertake it. At that time very little literature on the subjects to be taught was available and few men were available who had a knowledge of any of the subjects to be given, with the exception possibly of Military Subjects, Signalling, and to some extent, Engines. The University had, however, the organization, buildings, and men capable of absorbing the new material, organizing quickly and developing the work of the School.

Because of the rapid developments in the field of Aeronautics, the work given in the School was changed rapidly from time to time. The curriculum under which the School operated was revised six or eight times during the twenty months of operation of the School.

Because of the fact that the cadets taking the course knew practically nothing of the subjects before entering, and because of the further fact that they must absorb a pretty fair knowledge of the subjects given while here, the course was necessarily very intensive. It was intended to be that way so that only the men of highest qualifications and best physical condition would be able to complete the course at the Ground School.

A large part of the work was given by means of lectures, the balance of the time being spent in practical work in the laboratories. The intention was to give no more of theory than was necessary in order to understand the practical operation of the engine, the airplane and machine gun when in the air.

2. METHODS.

Due to the newness of the work and the intensive character ofthe work, the methods employed in imparting the desired information to the cadets were very important. The outline of the work to be given was prescribed by the War Department in curricula issued from time to time. These curricula, in the early stages, were rather incomplete, stating possibly only the number of hours to be devoted to a given subject. Later they became more detailed, giving not only the division of hours between topics, but also the division of hours by weeks and furnishing a fairly complete synopsis of the work to be given under each subject. As a further aid in supplying needed information to the instructors, the War Department has sent to the schools from time to time stencils, books, magazines and letters which have furnished the basis of the lecture and laboratory work given by the instructors. Naturally the work of the various departments has been changed from time to time, often very

[illegible]

[illegible] of Military Aeronautics when first started was on-[illegible] to undertake it. At that time very little literature [illegible] was available and few men were available who [illegible] to be given, with the exception possibly of Military [illegible] to some extent, engines. The University had, however, [illegible] the work of the School.

[illegible] developments in the field of Aeronautics, the work [illegible] changed rapidly from time to time. The curriculum under which [illegible]

[illegible] cadets taking the course knew practically [illegible] subjects, and because of the further fact that they must [illegible] knowledge of the subjects given while here, the course was [illegible] It was intended to be that way so that only the men of [illegible] and best physical condition would be able to complete the [illegible].

[illegible] was given by means of lectures, the balance of the [illegible] in the laboratories. The intention was to give [illegible] necessary in order to understand the practical operation [illegible] engine, the airplane and machine gun when in the air.

[illegible]

[illegible] the work and the intensive character of the work, the [illegible] the desired information to the cadets were very im-[illegible] to be given was prescribed by the War Department [illegible] to time. These curricula, in the early stages, were [illegible] possibly only the number of hours to be devoted to a given [illegible] more details, giving not only the division of hours [illegible] division of hours by weeks and furnishing a [illegible] to be given under each subject. As a further aid in [illegible] to the instructors, the War Department has sent to the [illegible] have furnished [illegible] and laboratory work given by the [illegible] departments has been changed from [illegible]

radically, these changes being due to the newer and later stencils received from the War Department showing the advancement made in the work on the Western Front.

The parts of the work which it was possible to deliver by lectures have been made as interesting as possible and as informal as possible, but still maintaining the proper order and discipline. The cadets have always been encouraged to ask questions in the classroom. The use of lantern for showing slides, photographs and charts of interest has been very helpful. Blackboards have been available in all lecture rooms and have been used freely by the instructors in presenting their work. The cadets have been urged to take careful notes and to bring up points on which they are doubtful at the next meeting of the class. The notes as a rule in this School have not been taken up, as it has been the opinion here that if such a practice were followed the cadets might spend more time than they properly should on rewriting their notes and getting them in proper shape to hand in. The lecture rooms of the University have been used almost entirely for the lecture work of the School, although the Aeronautics Laboratory building has always had one or more rooms available for lecture purposes.

Although the War Department has furnished fairly complete data from time to time regarding the work of each department, it has, of course, been necessary for the instructors to devise the best method of presentation of the work. This has called for the selection of certain men for lecture work and others to handle laboratory work who are possibly not so well adapted for lecturing. It was the practice to select men in each department to give the lectures who were capable of quickly absorbing the material to be presented, who were good talkers, and if possible who have had previous teaching experience. Inasmuch as the work of certain of the departments was almost entirely lecture work, the necessity for having good lecturers is apparent. Models and ingenious devices for assisting in the presentation of the work have been devised in all the departments.

The nature of the laboratory work has varied very widely in the different departments. In the later months the curriculum has usually specified the number of cadets who were to receive instruction at a given time with one piece of equipment. For instance, the number of men to be assigned to one machine gun might be limited to eight. It was possible with these smaller groups to give more intensive training and also possible for each man to take part in whatever work was to be done. It has been possible practically always to have one instructor for each laboratory group, the work of the instructor being to explain the work as it is carried out and insist upon every man taking part in the work as it progresses.

As noted above, the cadets were urged to take careful notes. In addition a syllabus of the course of lectures or laboratory work was furnished to each cadet wherever this was deemed advisable. The practice regarding this point has differed somewhat in the various departments. The Military Subjects Department has found it very helpful to furnish to the cadets a skeleton outline of each lecture, giving possibly two or three words on each subject under discussion. The cadets are then required to fill in the notes, thereby gaining an orderly and fairly complete set of notes. In some of the technical branches it has been found desirable to furnish

a fairly complete syllabus on certain parts of the work. For instance, in the Gunnery Department a complete syllabus on Nomenclature has been furnished each cadet and the same plan has been carried out in some of the other departments.

A special study period in the evening of two hours length was always maintained and for a while compulsory additional instruction was given from 1 p. m. to 2 p. m. each day for cadets who were weak in some subject. This latter plan was not approved by the War Department, however, and was abandoned.

3. DIVISION BY DEPARTMENTS.

The work of the School of Military Aeronautics naturally divided into certain departments. The curriculum always outlined the work in this manner, specifying the name of the department and the amount of work to be covered by that department. In order to keep progress with the rapid changes in the field of Aeronautics, it was necessary for the War Department to revise the curriculum frequently, often changing the names of the departments and re-grouping the work under different heads. However, the principal departments, such as Airplanes, Gunnery, Engines, etc., have remained very much the same throughout the course.

In the earlier months of operation of the School when the attendance was fairly small and the School was operating on the eight weeks' curriculum, the work of each department in point of hours was fairly small, although at that time the work of developing the course was extremely difficult. Later the work of each department naturally grew and it became necessary to appoint heads of departments, and the heads of departments in turn found it advisable to subdivide their responsibility among the different men in the department.

4. ORGANIZATION OF DEPARTMENTS.

In the early months of operation of the School, because of the large amount of work required in developing the lectures and laboratory work the organization of the various departments was somewhat neglected. In September, 1917, however, the heads of the various departments were formally appointed by the President of the Academic Board, although these men had been serving unofficially as heads of the departments for some time prior to that date. The interior organization of each department has varied considerably. In certain of the departments where the staff personnel was not large, it was possible for the head of the department to keep in close touch himself with all work in the department. In most cases, however, particularly in the later months, the heads of departments have found it advisable and essential to delegate part of the administrative work of the department to the instructors. The head of the department has been responsible for all work in the department, oversees the assignment of the various instructors to their work, watches the methods of instruction to see that they are uniform, looks over the grading of the papers, etc. The detailed work, however, of preparing the weekly schedule of work in the department, notifying the instructors of their hours, preparation of examination questions, holding the examinations, etc., has beenassigned by the head of the department to various men in the department.

of the department to various men in the department.

Instruction.

Another very important part of the work of the head of a department has been the instruction of new instructors. He has been responsible for seeing that new instructors are put in possession of the necessary material for study, and has also been responsible for seeing that their instruction is along the lines as laid out in the curriculum and that it will conform with the work then being given in the department.

A good example of departmental organization is furnished under "Instruction-Airplanes", that department having one of the best organizations in the School.

5. INSPECTOR OF INSTRUCTION.

The President of the Academic Board was directly responsible for the efficiency and character of instruction given, and also responsible for the type of instructor. As the School increased in size, however, it was practically impossible for the President of the Academic Board to keep in as close contact with the instruction being given as was desirable. It seemed necessary that someone should be able to visit some of the classes every week in order to compare the work of various instructors, and see that the work in a given department agreed with the curriculum issued by the War Department. The President and Vice-President of the Academic Board have attempted to do this as far as possible, but in July, 1918, an Inspector of Instruction was appointed for this purpose. This man was Dr. H. W. Edwards, a graduate of the University of California, and a man who has had six or more years of teaching experience. In addition to his work as Inspector of Instruction he was also an instructor in the Gunnery Department, thereby coming in actual contact and knowing personally the problems met by the instructors. A card index showing the impressions received by Dr. Edwards upon visiting the work of each instructor was kept. This was very helpful in choosing the proper men for lecture work, in maintaining uniform instruction, and in upholding the work of instruction in general.

As an idea of the suggestions made to instructors from time to time by the Inspector of Instruction, the following excerpts from a talk to the staff by Dr. Edwards in August, 1918 are quoted:

"1 - Use the blackboards in lectures -- it gives the cadet time to make notes and helps to hold his attention.

2 - Introduce questions into the lectures -- but let the cadet "use the ivory".

3 - Speak distinctly, and loud enough so that those in the back of the room can hear.

4 - Hold the interest of the cadets, by use of blackboards, apparatus, unexpected sounds, etc.

5 - Make all statements complete, concise and coherent -- some of the cadets might possibly want to know what you are talking about.

6 - Don't talk too fast -- they won't be able to see you for dust.

instruction.

[illegible] very important part of the work of the head of a department has been the initiation of an instructor. He has been responsible for seeing that each [illegible] is in possession of the necessary material for study, and has also been responsible for seeing that their [illegible] instructing the class is fully at the disposal of the instructor and that it will conform with the work then being given in the [illegible].

[illegible] of instructional organization is [illegible] "Instruction-Airplanes", that department having one of the best organizations in the School.

INSPECTION OF INSTRUCTION.

The President of the Academic Board was directly responsible for the efficiency of instruction given, and also responsible for the type of instructor. As the School progressed in size, however, it was practically impossible for the President of the Academic Board to keep in as close contact with the instructors as was desirable. It became necessary that members should be able to visit some of the classes every week in order to discover the work of various instructors, and to keep them in a given department abreast with the curriculum issued by the War Department. The President and Vice-President of the Academic Board were attempting to do this as far as possible, but in May, 1918, an Inspector of Instruction was appointed for this purpose. This was Mr. J. H. Wendle, a graduate of the University of California, and a man who had had a lot of teaching experience. In addition to his work as Inspector of Instruction he was also an instructor in the Primary Department, giving lectures in general tactics and dealing especially the problems met by the observers. A good deal more attention was thus given to instruction by the Inspector upon visiting the work of each instructor was made. This was very helpful in choosing the proper men for teaching work, in maintaining uniform instruction, and in regulating the work of instruction in general.

As an idea of the suggestions made to instructors from time to time by the Inspector of Instruction, the following extracts from a talk to the staff by him towards in August, 1918 are quoted:

"1 - Use the blackboards in lectures -- it gives the cadet time to make notes and helps to hold his attention.

2 - Introduce questions into the lectures -- but let the cadet "use the iron".

3 - [illegible] directly, and find enough so that those in the back of the room can hear.

4 - Find out the interest of the cadets, by use of blackboards, questions, demonstrations made, etc.

5 - Make all statements complete, concise and coherent -- some of the cadets might possibly want to know what you are talking about.

6 - Don't talk too fast -- they won't be able to see you for dust.

Instruction.

7 - Don't talk too slow - else you'll have a bunch of sleeping beauties on your hands.

8 - If a cadet asks a question, repeat the question and answer it to the entire class -- several others probably wanted to ask the same question but didn't have the nerve.

9 - Be patient with boob questions -- it's probably only by the grace of God that you aren't a cadet yourself.

10 - Write out all new terms, words, etc., so the cadet can get some idea as to what they look like.

11 - Speak from notes or outlines, and have the lecture logically developed.

12 - If possible, cadets should read the syllabus before coming to the lecture, and only make short notes when in class.

13 - If time permits, review the previous lecture before beginning a new one, where previous lectures are necessary for present understanding of the subject.

14 - If possible, summarize each lecture before closing emphasizing the principal points -- it helps the cadet to avoid wasting his time on non-essential details.

15 - Instructor should show energy and enthusiasm -- its contagious.

16 - Don't display a grouch, even if you do feel it -- its equally contagious.

17 - Enter a class with a definite purpose in mind, and see that it gets across.

18 - Use the blackboard with small groups, as well as in lectures."

6. INSTRUCTION BY DEPARTMENTS.

In considering the work of instruction more in detail it will be taken up by departments in the form of a general write-up of each department, although included under the head of instruction. A write-up of each department is desirable and it should probably be included under the subject of instruction, although as herein prepared these reports on departments include more than discussion of methods of instruction.

These reports by departments are prepared along the following general lines, although differing to some extent in each department because of the difference in character of work given, etc. Pictures have been freely used, Syllabi of the

7 - Don't turn your back - use your left hand to discipline students in your classes.

8 - If a student asks a question, repeat the question and answer it in the <u>public lecture</u> -- several students probably wanted to ask the same question but didn't have the nerve.

9 - Do not answer all student questions -- it's probably only by the grace of God that you aren't a naked prophet.

10 - Write out all new terms, words, etc., on the board and pronounce them so that they look like.

11 - Keep your desk in order, and have the lecture regularly assigned.

12 - If possible, people should read the syllabus before coming to the lecture, and only make <u>short</u> notes when in class.

13 - If time permits, review the previous lecture before beginning a new one, where previous lectures are necessary for present understanding of the subject.

14 - If possible, summarize each lecture before closing emphasizing the principal points -- it helps the class to avoid wasting his time on non-essential details.

15 - Instructor should show energy and enthusiasm -- its contagious.

16 - Don't display a grouch, even if you do feel it -- its equally contagious.

17 - Lecture rooms with a definite purpose in mind, and are <u>like it rate across.</u>

18 - Use the blackboard with <u>small</u> groups, as well as in lectures."

<u>6. Instruction in Laboratory.</u>

Inconsidering the work of instruction more in detail it will be taken up by departments in the form of a general write-up of each department, although special mention the kind of instruction. A write-up of each department is desirable and it would probably be followed under the subject of instruction, although as matrix preparing these reports in departments include more than discussion of methods of instruction.

These reports by departments are prepared along the following general lines, although differing to some extent in each department because of the difference in emphasis of each group, etc. Courses are first briefly described, number of the

various courses are included as appendices, sample examination questions are included and reports formerly prepared by some of the departments have been quoted from as the writer was not familiar with the details of instruction in all departments.

a. General - Describing the work of the department in a general way, subjects covered, length of course, etc.

b. Staff - Type of instructor used, particular qualities desired, department organization, personnel, etc. (Also see main heading "Instructors")

c. Curriculum Requirements - Including table summarizing briefly each of the curricula which were in operation for any length of time. (Also see main heading "Curriculum")

d. Laboratory Space - Describing the development of the laboratories, space available, special features, etc. (Also see main heading "Buildings for Instruction").

e. Laboratory Equipment - Including description and illustrations of special equipment used.

f. Instruction-General - Describing in a general way the subjects covered, special methods used, etc.

g. Instruction - (Subheads in each department) Taking up the special branches of the work in each department.

h. Examinations - Brief reference to examinations given with sample copies of final examinations. Under the Military Subjects Department is included a detailed report on the method of conducting examinations adopted by that department, a similar, but possibly not so elaborate scheme being used by each department.

Instruction-Military Subjects.

7. MILITARY SUBJECTS DEPARTMENT

a. General: A course in the study of Military Subjects is essential and has always been included in the curriculum of the Ground School. The composition of this course has changed materially during the progress of the school. The department has always consisted of a theoretical course of lectures on Military Subjects and a practical course devoted to instruction in drill and work on the field.

Under the original curriculum of June 11, 1917, as noted previously in this report, the course of instruction was divided into a Junior Wing of three weeks and a Senior Wing of five weeks. The Junior Wing was devoted very largely to practical work in Military Subjects together with eleven lectures all of which were given prior to the end of "C" week.

With the revision of the eight weeks' curriculum under date of November 1, 1917, the theoretical instruction was increased to twenty hours, still being given in the first three weeks of the course, and eighty-five hours practical drill were included in this curriculum, sixty of these hours being given in the first three weeks. From this it may be seen that the plan was to concentrate the instruction in Military Subjects in the first few weeks of the course.

With the institution of the twelve weeks' curriculum of April 1, 1918, the name of the department was changed from Military Studies to Military Subjects and the theoretical work in the department was doubled, forty-one hours of instructing being given under this curriculum. The practical work was increased to one hundred and thirty-five hours and the length of course of instruction in Military Subjects was increased to ten weeks from "A" to "K" inclusive.

The last revision of the twelve weeks' curriculum, under date of October 14, 1918, decreased the theoretical instruction in Military Subjects to twenty-nine hours which was to be covered by Pilots, Bombers and Observers. Instruction in gas defense, however, (the time for which formerly had been deducted from drill hours) was listed separately in this last revision of the curriculum so that the net reduction in the number of hours devoted to theoretical instruction was comparatively small. The theoretical part of the course was completed by the end of the sixth week. Practical instruction amounted to one hundred and thirty-two hours for Pilots, ninety-nine hours for Bombers and one hundred and nine hours for Observers, the difference in these amounts being due to the difference in the length of the courses.

During the early months of operation when the size of the School was comparatively small and the amount of instruction in the Military Subjects Department was not large, both the theoretical and practical work were handled by the Head of the Military Subjects Department. After the increase in the course in Military Subjects it was not practical for one man to superintend both the theoretical and practical work of the department. A department of Drill

Instruction-military subjects.

7. Military subjects department.

a. General: A course in the study of military subjects is annually and has always been included in the curriculum of the Naval School. The organization of this course has changed materially during the progress of the school. The department has always consisted of a theoretical course of lectures on military subjects and a practical course devoted to instruction in drill and work on the field.

Under the original curriculum of June 11, 1917, as noted previously in this report, the course of instruction was divided into a Junior Wing of three weeks and a Senior Wing of five weeks. The Junior Wing was devoted entirely to theoretical work in military subjects together with eleven lectures all of which were given prior to the end of "G" week.

With the revision of the eight weeks' curriculum under date of November 1, 1917, the theoretical instruction was compressed to twenty hours, still being given in the first three weeks of the course, and eleven practical drill periods included in this curriculum, eight of these hours being given in the first three weeks. From this it may be seen that the plan was to concentrate the instruction in military subjects in the first 3½ weeks of the course.

With the institution of the twelve weeks' curriculum of April 1, 1918, the name of the department was changed from military-studies to military subjects and the theoretical work in the department was doubled, forty-one hours of instructing being given under this curriculum. The practical work was increased to one hundred and thirty-five hours and the length of course of instruction in military subjects was increased to two weeks from "G" to "K" inclusive.

The last revision of the twelve weeks' curriculum, under date of October 14, 1918, decreased the theoretical instruction in military subjects to twenty-five hours and it was covered by Military Subjects and Observers. Instruction in gas defense, however, (the time for which formerly had been deducted from drill hours) was listed separately in this last revision of the curriculum so that the net reduction in the number of hours devoted to theoretical instruction was comparatively small. The theoretical part of the course was completed by the end of the sixth week. Practical instruction amounted to one hundred and thirty-two hours for Pilots, ninety-nine hours for Bombers and one hundred and nine hours for Observers, the difference in these amounts being due to the difference in the length of the courses.

During the early months of operation when the size of the School was comparatively small and the number of instructors in the military subjects department was too large, not the theoretical and practical work were handled by the Head of the Military Subjects Department. After the increase in the course in Military Subjects it was not practical for one man to supervise both theoretical and practical work of the department. A department of drill

and Discipline was organized to handle the drill instruction work and practical disciplinary instruction and take charge of the barracks, the head of the Military Subjects Department from that time on being responsible only for the theoretical instruction. The two departments naturally were very closely related and worked harmoniously together. The work in the Drill and Discipline Department will be taken up later, the following paragraphs under this head being devoted to the theoretical or lecture work only.

b. Staff: First Lieut. Roy J. Heffner was the first Head of the Military Subjects Department, holding this position until request came from Washington in June 1918 asking that he be transferred there. The organization of the instructional work of this department was highly developed under the supervision of Lieut. Heffner and reports on the work of the department prepared by him and submitted to Washington were highly commended by the office of the Chief Signal Officer. When Lieut. Heffner was transferred to Washington, Lieut. Neil D. Mathews was appointed Head of the Department and has carried on successfully the work so well outlined by Lieut. Heffner.

As noted above, the theoretical work in this department has been entirely lecture work. For this reason it was necessary to use men in this work who were capable as lecturers. The work in Hygiene, Sanitation and First Aid was given by the Post Surgeon and his assistants. The lectures on other military subjects were given by instructors who had had military training at the University of California and some of these instructors had also served in officers' training camps.

A complete list of the personnel of the staff in the Military Subjects Department is shown in Appendix II. It has seemed desirable to use as instructors in this department commissioned officers as far as possible, this being particularly true of the practical drill instruction. This appendix includes drill instructors as well as the men who gave the theoretical work. From Appendix II certain points of interest might be noted as follows. A total of twelve out of thirty-two instructors in the department served a part or all of the time as commissioned officers; practically thirty percent of the instructors were university graduates and sixty percent were university students of from one to three years' standing. This large number of students resulted from the fact that it was practical and efficient for a number of months to use as drill instructors university students who had had two or three years' instruction in the Military Department of the University and who had stood well in that branch of the work. The average length of service of all instructors in the Military Subjects Department was 7.8 months, approximately the same as the average length of service of all instructors in the school.

c. Curriculum Requirements: A general outline of the requirements in the Military Subjects Department for the different curricula has been given above. In considering in more detail the requirements in this department the curricula of the following dates only will be noted:

and Discipline are regarded to handle the drill instruction work and practical military instruction and take charge of the barracks, the head of the military department from that time on being responsible only for the theoretical instruction. The new department was early very highly regarded and notably successful. The work in the Drill and Discipline department will be taken up later, the following paragraphs under this head being devoted to the theoretical or lecture work only.

b. Staff: First Lieut. Roy L. Heffner was the first Head of the military department. During this period of military control regular use from headquarters in San Jose began that has been continued since. The organization of the instructional work of this department was highly developed under the supervision of Lieut. Heffner and reports on the work of the department prepared by him and submitted to Washington were highly commended by the office of the Chief Signal Officer. Lieut. Heffner was transferred to Washington. Lieut. Neil D. Mathews was appointed Head of the Department and has carried on successfully the work so well outlined by Lieut. Heffner.

As noted above, the theoretical work in this department has been entirely lecture work. The lecturers in our academic classes were in this work the principals in instruction. The duty in regards, instruction and first aid was given by the Post Surgeon and his assistants. The lectures on other military subjects were given by instructors who had had military training in the University or California and some of these instructors had also served in officers' training camps.

A complete list of the personnel of the staff in the Military Subjects Department is shown in Appendix II. It has seemed desirable to give an historical sketch of this department, considering officers as far as possible, note being particularly true of the practical drill instruction. This appendix includes drill instructors as well as the men who gave the theoretical work. From Appendix II certain points of interest might be noted as follows. A total of twenty-six instructors in the department served a part or all of the time in commissioned official positions, particularly thirty-seven of the instructors were university graduates and eight persons were university students of less than two to three years' standing. This large number of students resulted from the fact that it was practical and advisable for a number of months to use as drill instructors university students who had had one or three years' instruction in the Military Department of the University and who had stood well in that branch of the work. The average length of service of all instructors in the Military Department was 1.3 months, approximately the same as the average length of service of all instructors in the school.

c. Instructional Personnel: A general outline of the requirements for the Military Subjects Department for the different curricula was less given earlier in connection in some detail the requirements in this department for the curricula of the following dates only will be noted:

Instruction-Military Subjects.

Curriculum of June 11, 1917,
" " Nov. 1, 1917,
" " Apr. 1, 1918,
" " Oct. 14, 1918.

The revisions of September 26, 1917, and March 1, 1918, were superseded so soon after their issue that consideration of them will not be necessary. The following table shows the hours devoted to practical and theoretical instruction in Military Subjects in the different curricula under which the school operated.

Table No. 9.

Total Hours Required in Curriculum of

						10/14/18		
Military Studies	6/11/17	9/26/17	11/1/17	3/1/18	4/1/18	Pilots	Bombers	Observers
Theoretical	11							
Military Studies								
Practical		88						
Theoretical		20						
Examination		2						
Military Studies								
Practical			85					
Theoretical			20					
Saturday Inspection			8					
Examination			2					
Military Subjects								
Practical				135	135			
Theoretical				40	41			
Weekly Inspection				12	12			
Examination				3	2			
Military Subjects								
Drills						132	99	109
Theoretical						29	29	29
Examinations						3	3	3
Gas Defense						8	8	8
Examinations						1	1	1

The curriculum of June 11, 1917, included eleven lectures on Military Subjects to be devoted to the following topics:

1 Hour - Military Policy of the U. S.
1 " - Military Hygiene
3 Hours- Administration and Military Law
2 " - Army Regulations
4 " - Organization of Modern Armies

With the revision of November 1, 1917, the number of lectures on theoretical

Instruction-Military Subjects.

Military Subjects was increased to twenty, and as noted in Stencil No. 37, Appendix F4 were to be as follows:

Lectures, Demonstrations and Study of Tactics on -

(1) - Military Courtesy, Esprit de Corps and Morale
(2) - Organization and Administration of the U. S. and Modern European Armies.
(3) - Army Regulations, Orders, Army Paper Work and the Use of Forms.
(4) - Military Law, both Substantive and Administrative.
(5) - Military Hygiene.

The curriculum requirements under the twelve weeks' curriculum of April 1, 1918, are outlined in considerable detail under that curriculum in Appendix F5 . The theoretical work which was given after this curriculum was put into effect may be shown briefly by the following table. From this table it will be noted that the department was handling a total of fifty-three hours per week, whereas the curriculum apparently calls for only forty-one. The increase is due to instruction on gas war and first aid demonstrations, the time for which was taken from drill hours and the table below also includes two or three extra hours of more or less administrative work which the Military Subjects Department undertook to carry out with each entering squadron.

Discipline - - - - - - - - - - - - - - - -	1 hour
Courtesy - - - - - - - - - - - - - - - -	2 hours
Guard Duty - - - - - - - - - - - - - - - -	2 "
Administration & Organization U.S.A. - -	3 "
Hygiene Lectures - - - - - - - - - - - - -	5 "
First Aid Demonstration - - - - - - - - -	2 "
Paper Work - - - - - - - - - - - - - - - -	10 "
Regulations - - - - - - - - - - - - - - - -	5 "
Infantry Drill Regulations - - - - - - - -	1 "
Law -	6 "
Modern Warfare - - - - - - - - - - - - - -	4 "
Gas Lectures - - - - - - - - - - - - - - -	3 "
Gas Drill - - - - - - - - - - - - - - - - -	4 "
Morale - - - - - - - - - - - - - - - - - -	1 "
Organization S.M.A. - - - - - - - - - - -	1 "
Filling of record cards - - - - - - - - -	1 "
Examination - - - - - - - - - - - - - - - -	2 "
Total - - -	53 hours per week.

At the time the curriculum was revised on October 14, 1918, the Military Subjects Department was revising its lecture notes and syllabi and this new curriculum caused some changes in the revision then being made. Due to the signing of the armistice, however, this work was not completed and the instruction given under the twelve weeks' curriculum of April 1, 1918, is the best representation of the work of this department.

The curriculum requirements under the twelve weeks' curriculum of April 1, 1918, are detailed in considerable detail under that curriculum in Appendix 15. The instructions were given after this curriculum was put into effect by a series of circulars which are quoted below. Some time ago it will be seen that the department was dealing a total of 1141 minutes per week, average for instruction experience only for only twelve-men. The instructor is now in Washington in the war and the time all concentrations. The instructor for which was taken from drill hours and the table below also includes two or three extra hours - the last concentration - which the Military Science Department undertook to carry out with each entering squadron.

Discipline - - - - - - - - - - - - - - - -	1 hour
Courtesy - - - - - - - - - - - - - - - - -	2 hours
Guard Duty - - - - - - - - - - - - - - - -	2 "
Administration & Organization U.S.A. - - -	3 "
Hygiene Lecture - - - - - - - - - - - - - -	5 "
First Aid Demonstration - - - - - - - - - -	2 "
Paper Work - - - - - - - - - - - - - - - -	10 "
Regulations - - - - - - - - - - - - - - - -	3 "
Infantry Drill Regulations - - - - - - - -	1 "
Law -	6 "
Gas Lecture - - - - - - - - - - - - - - - -	5 "
Gas Drill - - - - - - - - - - - - - - - - -	4 "
Morale - - - - - - - - - - - - - - - - - -	1 "
Filling of record cards - - - - - - - - - -	1 "
Examination - - - - - - - - - - - - - - - -	2
Total - - -	53 hours per week.

At the time the curriculum was revised on October 14, 1918, the new curriculum caused some changes in the revision then being made. Due to the signing of the armistice however, some of the contents and the instruction given under the twelve weeks' curriculum of April 1, 1918, is the best representation of the work of this department.

Instruction-Military Subjects.

The lectures on Gas Defense noted in the above outline were given by Assistants to the Post Surgeon. The gas drills were conducted by the same officers, assisted by enlisted drill instructors. The picture on Page 97 shows one of the gas drills in which a gas mask is being placed on a "wounded soldier".

d. Laboratory Space and Equipment: As noted above, the theoretical work in Military Subjects was practically all lecture work and was given in the lecture rooms of the University, no special laboratory equipment being required. The only work which could be considered at all in the nature of laboratory work was the instruction on Army Paper Work. This consisted of filling out various types of forms used in Army Paper Work but required no special equipment other than copies of the forms.

e. Instruction - General: The Military Subjects Department early adopted the policy of furnishing to each cadet a syllabus covering in skeleton form the outline of every lecture to be given. On account of the large amount of more or less memory work required it seemed desirable to the department to present the work in that form. The preparation of these syllabi has been fairly expensive inasmuch as the skeleton outline, with space provided for taking notes, required considerably more paper than would otherwise be necessary but it is believed that the plan was satisfactory. It furnished to each cadet a much more complete set of notes than he otherwise would have been able to obtain during the lectures and on the other hand the fact that the syllabus was in skeleton form only tended to hold the attention of the class throughout the lectures. In the instruction in Army Paper Work blank forms were furnished by the War Department and additional forms were furnished by the University using as samples the copies submitted by the War Department. Every cadet was required, as a part of the Army Paper Work, to fill out certain of these forms in class.

f. Instruction - April 1, 1918 Curriculum: Inasmuch as the work of the Military Subjects Department under the April 1, 1918 Curriculum was probably the best presentation prepared by this department, a fairly complete outline will be given of the instruction furnished under that curriculum. On May 20, 1918, Lieut. Heffner submitted through the Commandant to the Chief of Air Service a complete report on the Department of Military Subjects as then given by the School. This report contained a complete set of notes as then used by the instructors and a complete set of the syllabi furnished to cadets. The report was received very favorably in Washington and fifty copies of all mimeographed and printed notes were requested by the Air Training School Section. The following pages taken from the above report furnish a fairly complete outline of the course of lectures given at this School in Military Subjects under the April 1, 1918 curriculum. Copies of the Syllabi furnished to cadets are also included in this report as Appendix K1 .

INSTRUCTION GIVEN IN THE DEPARTMENT:-

1. ORGANIZATION OF THE S.M.A.- 1 hour -

This is the first hour during which the cadets are given any instruction, and consequently the discussion is kept as informal as possible. The first fifteen or twenty minutes are devoted to an address by the Commandant who speaks to the

Instructional Subjects.

The lectures on the defences noted in the above outline were given by instructors in the Department. The gas drills were conducted by the same officers, assisted by qualified drill instructors. The picture on page 37 shows one of gas gas drills in which a gas mask is being placed on a "wounded soldier".

d. Laboratory Space and Equipment: As noted above, the theoretical work in military subjects was practically all lecture work and was given in the lecture rooms of the University, no special laboratory equipment being required. The only work which could be considered at all in the nature of laboratory work was the instruction on Army Paper Work. This consisted of filling out various types of forms used in the Army. Each one received an special equipment other than copies of the forms.

e. Instruction - General: The Military Subjects Department early adopted the policy of furnishing to each cadet a syllabus covering in analysis form the outline of every lecture to be given. By reason of the large number of more or less memory work required it seemed desirable to the department to present the work in this form. The preparation of these syllabi has been deeply appreciated as the results speak for themselves, with space provided for taking notes, required considerably more paper than would otherwise be necessary but it is believed that the plan was satisfactory. It required to each cadet a much more complete set of notes than he otherwise would have been able to obtain during the lectures and on the other hand the fact that the syllabus was in skeleton form only tended to hold the attention of the class throughout the lecture. In the instruction in Army Paper Work blank forms were furnished by the War Department and additional forms were furnished by the University using as samples the copies furnished by the War Department. Every cadet was required as a part of the Army Paper Work to fill out certain of these forms in class.

f. Instruction - April 1, 1918 Curriculum: Inasmuch as the work of the Military Subjects Department under the April 1, 1918 Curriculum was probably the best presentation prepared by this department, a fairly complete outline will be given of the instruction furnished under that curriculum. On July 30, 1918, Lieut. Heffner submitted through the Commandant to the Chief of Air Service a complete report on the Department of Military Subjects as then given by the School. This report contained a complete set of notes as then used by the instructors and a complete set of the syllabi furnished to cadets. The report was received very favorably by Washington and fifty copies of it mimeographed and printed copies were furnished to the Air Training School Centers. The following pages from the above report furnish a fairly complete outline of the course of lectures given at this School in military subjects under the April 1, 1918 curriculum. Copies of the syllabi furnished to cadets are also included in this report as Appendix XI.

INSTRUCTION GIVEN IN THE DEPARTMENT:-

1. ORGANIZATION OF THE S.M.A.- 1 hour -

This is the first hour during which the cadets are given any instruction, and consequently the discussion is kept as general as possible. The first fifteen or twenty minutes are devoted to an address by the Commandant who speaks to the

Plate No. 5 - Gas Drill - Placing mask on "wounded soldier".

men on discipline, esprit de corps, and what will be expected of a man who intends to "make good" in the School. The balance of the hour is taken up with the distribution of instructional material, discussion of the School itself, and answering of beginners' questions.

2. DISCIPLINE 1 hour -

After having been introduced to the School the cadets are next given a one hour lecture on the subject of military discipline. It is desired that men in the School shall realize the importance of this subject from the first day in military life. Short extracts are read from the Army Regulations and other sources, and time is devoted to the amplification and interpretation of these extracts. Examples are quoted, means of securing discipline are given, etc.

3. COURTESY 2 hours -

The subject of military courtesy is also presented early in the course. Two lectures are given. The topics are carefully arranged, and take up the methods of rendering military courtesy on all ordinary occasions. Salutes to colors, standards, officers, National Anthem, and bugle calls are explained. The attempt is made to show the men that the salute is not a sign of inferiority on the part of the man giving it, but an exchange of greetings between brothers.

4. HYGIENE & SANITATION - FIRST AID 7 hours -

The subjects of military hygiene, sanitation, and first aid are covered by a series of lectures and demonstrations covering a period of seven hours, in accordance with the following outline:

a. Lectures; 5 hours

In lecture work the definition of terms such as "hygiene", "sanitation", "conservancy", etc. are presented; methods of practicing sanitation are given; communicable diseases and immunity are explained; venereal diseases are discussed and a few sound moral and physical principles expounded; theories and methods of diagnosing simple injuries and accidents are noted, together with methods of first aid treatment therefor.

b. Demonstrations; 2 hours

Students are assembled on the drill field in small sections, each section under the guidance of an instructor, and are given practice in first aid methods, including artificial respiration, bandaging, transportation of wounded, etc.

5. GUARD DUTY 2 hours -

Two hours of lectures are given on the general subject of Guard Duty, including principally a discussion of the Interior Guard. Duties of the several officers and non-commissioned officers and privates of the guard are explained. General and special orders for sentinels are given and explained. Rules for countersigns, patrols, reliefs, challenging, etc. are given. Each cadet is required to complete a tour of guard duty under the direction of the Department of Drill & Discipline.

son an discipline, esprit de corps, and what will be expected of a man who intends to "make good" in the Army. The balance of the hour is taken up with the distribution of instructional material, discussion of the School itself, and answering of beginners' questions.

2. DISCIPLINE - 1 hour -

After having been introduced to the School the cadets are next given a one hour lecture on the subject of military discipline. It is desired that men in the School shall realize the importance of this subject from the first day in military life. Short extracts are read from the Army Regulations and other sources, and time is spent on the application and interpretation of these extracts. Examples are cited, some of exacting discipline are given, etc.

3. COURTESY 2 hours -

The subject of military courtesy is also presented early in the course. Two lectures are given. The topics are briefly arranged, and take up the matters of saluting, military courtesy on all ordinary occasions, salutes to colors, standards, officers, National Anthem, and music only; are explained. The attempt is made to show the men that the salute is not a sign of inferiority on the part of the man giving it, but an exchange of greetings between brothers.

4. HYGIENE & SANITATION - FIRST AID 7 hours -

The subjects of military hygiene, sanitation, and first aid are covered by a series of lectures and demonstrations covering a period of seven hours, in accordance with the following outline:

a. Lectures; 5 hours

In lecture work the definition of terms such as "hygiene", "sanitation", "emergency", etc. are presented; methods of preventing sanitation and disease, communicable diseases and immunity are explained; typical diseases are discussed and a few sound laws and physical principles concerning theories and methods of determining illness in order one methods are noted. Lecture with methods of first aid treatment therefor.

b. Demonstrations; 2 hours

Students are assembled on the drill field in small sections, each section under the guidance of an instructor, and are given practice in first aid work, including artificial respiration, bandaging, transportation of wounded, etc.

5. GUARD DUTY 2 hours -

Two hours of lectures are given on the general subject of Guard Duty, including principally a discussion of the Interior Guard. Duties of the general officers and non-commissioned officers and privates of the guard are explained. General and special orders for sentinels are given and explained. Rules for countersigns, patrols, relieffs, challenging, etc. are given. Each cadet is required to complete a tour of guard duty under the direction of the Department of Drill & Discipline.

Instruction-Military Subjects.

6. LAW 6 hours

Instruction in military law covers a total of six hours. The Articles of War and interpretations thereof are discussed. On account of the time employed the actual reading of the Articles word for word has been abandoned, and the summarized method of presentation adopted - with better results. Following the hour devoted to the Articles of War come four hours of lectures on the subjects of military jurisdiction, types of tribunals, rules for members, witnesses, evidence, etc. During the last of these four hours the students are given a conference on the conducting of a mock General Court Martial. The final hour of the work is turned over entirely to the students for holding the Court, members of the Department being in the audience, and making all essential criticisms of the procedure.

7. REGULATIONS 6 hours

The subject of regulations has been divided into the following topics: (1) Uniform & Insignia, (2) Regulations of the Enlisted Man, (3) Regulations of the Commissioned Officer, (4) Infantry Drill Regulations. Each is discussed in accordance with the following brief outline:-

a. Uniform & Insignia - 1 hour

The importance of realizing what constitutes the uniform of the U. S. Army cannot be overestimated. As a matter of discipline, if for nothing else, each student should be made to wear the prescribed uniform and that only, and to be able to tell errors in such matters when he discovers them. For purposes of military courtesy he should know the insignia of officers and men in our own Army, and something of those in foreign armies. With this end in view one hour is devoted to the subject.

b. Regulations of the Enlisted Men - 2 hours

The regulations which refer to enlisted men have been grouped together and are given in a series of two lectures. In order to relieve the monotony of giving out straight facts the lectures are given in story form, starting with a civilian and following him through a period of enlistment in the Regular Army, and comparing the events which befall him with those which might be encountered in other branches of the service. The points covered are enlistment, pay, furlough, promotion, transfer, travel on duty, discharge, desertion, retirement, and death. Special blank forms are displayed in class.

c. Regulations of the Commissioned Officer - 2 hours.

The regulations which affect a commission officer are presented in story form also, as the continuation of the previous series affecting the enlisted men. The same general topics are discussed, making the necessary changes and revisions as they affect commissioned officers. Blank forms which occur frequently and yet which are not of enough importance to warrant a discussion of paper work are brought to class and displayed during the discussion.

d. Infantry Drill Regulations - 1 hour.

In order that the students may properly interpret their exercises in infantry drill which are given by the Department of Drill & Discipline, the Department of Military Subjects devotes one hour to a lecture on points not

ing the hour devoted to the Articles of War come four hours of lectures on the evidence, etc. During the last of these four hours the students are given a the work is turned over entirely to the students for holding the Court, members the procedure.

The subject of regulations has been divided into the following topics: accordance with the following brief outline:-

a. Uniform & Insignia - 1 hour

The importance of realizing what constitutes the uniform of the U. S. Army cannot be overestimated. As a matter of discipline, it for nothing and to be able to tell errors in such matters when he discovers them. For pur- one hour is devoted to the subject.

b. Regulations of the Enlisted Men - 2 hours

The regulations which refer to enlisted men have been grouped monotony of giving out straight facts the lectures are given in story form, starting with a civilian and following him through a period of enlistment in the Regular Army, and comparing the events which befall him with those which might be encountered in other branches of the service. The points covered are desertion, retirement, and death. Special blank forms are displayed in class.

c. Regulations of the Commissioned Officer - 2 hours.

The regulations which affect a commission officer are presented of paper work are brought to class and displayed during the discussion.

d. Infantry Drill Regulations - 1 hour.

easily gained in the field. It covers the purpose of drill in general, units employed and types of drill, definitions of terms, elements of successful commanding, characteristics of a good commander, problems in movements, diagrams, etc.

8. PAPER WORK. 10 hours

The general subject of paper work has been subdivided into six topics as follows: (1) Sources of Information, (2) Correspondence, (3) Forms, affecting the Enlisted Man and the Commissioned Officer, (4) Routine Administration, (5) Public Property, (6) Accountability, Funds, Equipment. A brief outline of each topic follows:

a. Sources of Information 1 hour

Persons new in the military service should become familiar with the sources from which military information emanates. Standard War Department Manuals and publications are mentioned and briefly described. Orders, circulars, bulletins, mimeographed information, etc. are taken up and described. In other words an effort is made to give the student an idea of how to look up the governing requirements and regulations upon subjects which may occur in his military career.

b. Correspondence 2 hours

The military letter and its associated regulations are covered in great detail. The students are impressed with the fact that a letter over their signatures is an advertisement to the "military public", and that it should be accorded the greatest of care in preparation. Channels of communication are defined and explained. The military telegram, filing systems, etc. are also brought out.

c. Forms affecting Enlisted Man and Commissioned Officer - 2 hours.

This phase of paper work is coordinated with the topics by the series in Army Regulations covering the Enlisted Man and the Commissioned Officer. Minor forms and evidences of paper work are noted in passing the subject in the lecture on regulations, but important forms which should be taken up in detail, and for which instructions for preparation should be given, are presented in the lecture on paper work. Such forms are the Service Record, Individual Equipment Record, Deposit Forms, Furlough, Discharge Forms, Final Statements, etc., for the enlisted Man, and Mileage Voucher, Pay Voucher, Expense Voucher, Personal Reports, etc. for the Commissioned Officer. Forms taken up in this series are those which apply to the officer or soldier as an individual more than in connection with the administration of a command.

d. Routine Administration - 2 hours.

In this series are presented the forms which occur periodically in the routine administration of a company or squadron. Such are Company Return, Morning Report, Ration Return, Duty Roster, Sick Report, Guard Report, Council Book, Field Return, etc. The Pay Roll is discussed, but briefly, on account of the fact that information on the revised system is not yet available, and it does not seem desirable to give out obsolete information. Practice is given in filling out the forms. Details of the system may be found in the

easily gained in the field. It covers the purpose of drill in general, units and types of drill, definitions of terms, elements of successful commands, characteristics of a good commander, problems in movements, cadences, etc.

3. Field work. (2 hours)

The general subject of paper work has been subdivided into six topics as follows: (1) Sources of information, (2) Correspondence, (3) Forms, military, (4) Public Property, (5) Responsibility, Funds, Supplies, (6) Public Property, (7) Administration, (8) Public Property. A brief outline of each topic follows:

a. Sources of Information - 1 hour.

Persons new in the military service should become familiar with the various sources of military information available. Standard War Department manuals and publications are analyzed and briefly described. Orders, circulars, bulletins, miscellaneous information, etc., are taken up and discussed. In other words an effort is made to give the student an idea of how to look up the governing regulations and regulations upon which any matter in military affairs depends.

b. Correspondence - 2 hours

The military letter and its associated regulations are covered in great detail. The students are impressed with the idea that a letter over their signature is an advertisement to the "military public", and that it should be according the greatest of care in preparation. Economy of communication are defined and explained. The military letter, filing system, etc., are also brought out.

c. Forms affecting Enlisted Man and Commissioned Officer - 2 hours.

This phase of paper work is coordinated with the topics by the series in Army Regulations covering the Enlisted Man and the Commissioned Officer. Since Signal and Ordnance of paper work are noted in passing, the subject in the Instructor-Military Science, but important forms which should be taken up in detail, are the Army Instructions for preparation should be given, are presented in the lecture on paper work. Such forms are the Service Record, Individual Equipment Record, Temporal Forms, Furlough, Discharge Forms, Final Statements, etc., for the enlisted man, and Military Voucher, Pay Vouchers, Expense Vouchers, Personal Expense, etc., for the Commissioned Officer. Forms taken up in this series are those which apply to the officer or soldier as an individual only that in connection with the administration of a command.

d. Routine Administration - 2 hours.

In this series are presented the forms which occur periodically in the routine administration of a company or squadron. Such are Company Report, Morning Report, Daily Report, Daily Roster, Sick Report, Report, Council Book, Fire Drill, etc. The Pay Roll is discussed, but briefly, on account of the fact that information on the revised system is not available, and it does not seem desirable to give out obsolete information. Practice is given in filling out the forms. Details of the system may be found in the

instructor's Notes.

e. Public Property - 1 hour.

The Systems of handling and transferring public property, equipment, etc. and the various routines of paper work which arise are discussed. This instruction involves the use of such forms as Report of Survey, Inventory & Inspection Report, etc. Practice is given in making out the forms.

f. Accountability, Funds, Equipment - 1 hour.

Disbursing officers and their duties are discussed in this lecture. Accountability as applied to public moneys is briefly explained. Classification of equipment is brought out in summarized form. Such blank forms as the Property Return, Vouchers, Memorandum Receipts, etc. are introduced and explained. Practice is given with the forms.

g. Conference, practice and conclusions - 1 hour.

The final hour is devoted to clear up matters in doubt, to give additional practice in forms, and to review briefly the work of the course in Paper Work.

9. ADMINISTRATION & ORGANIZATION U. S. ARMY. 3 hours.

This series of three lectures, given during the early part of the courses, takes up the relations between the President, Secretary of War and Chief of Staff with regard to military matters; the organization of the Staff is explained; the Departments are covered in detail. Territorial Departments and Coast Artillery Districts are mentioned, as are organizations in training. Some information is given on the Amer. Exp. Forces. The organization of the entire army of the U.S. into its branches is discussed; then each branch is taken up and its various subdivisions explained. This lecture introduces detailed tables of organization covering the various units. The Aero Squadron is discussed in considerable detail.

10. MODERN WARFARE 11 hours.

The subject of Modern Warfare is divided into four topics; viz., (1) Trench Warfare, (2) Foreign Armies, (3) Gas Defense, (4) Gas Drill. Each is briefly explained in the following outline:-

a. Trench Warfare - 3 hours.

Under this topic are taken up points such as nomenclature of the trenches, service in the trenches, methods of attack and defense, etc. Considerable detail is presented, with the view of giving the prospective aviator some idea of what the trenches are, even though he may never serve in them. In order that the work of the air service may be properly coordinated with that of infantry it is essential that the aviator understand the methods of warfare in the trenches. Grenades, bombs, liquid fire, bayonet fighting, sniping, communicating, and other kindred subjects are introduced.

Instructor's Office.

e. Public property - 1 hour.

The system of handling and transferring public property, equipment, etc. and the various routines of paper work which arise in this branch. This instruction includes the use of such forms as Report of Survey, Inventory & Inspection Report, etc. Practice is given in making out the forms.

f. Accountability, Funds, Equipment - 1 hour.

Disbursing officers and their duties are discussed in this lecture. Accountability as applied to public money is briefly considered. Classification of equipment is brought out in summarized form. Such blank forms as the Property Return, Vouchers, Requisitions Receipts, etc. are introduced and explained. Practice is given with the forms.

g. Conference, practice and conclusions - 1 hour.

The final hour is devoted to clear up matters in doubt, to give additional practice in forms, and to review briefly the work of the course in Paper Work.

9. ADMINISTRATION & ORGANIZATION U. S. ARMY. 3 hours.

This series of three lectures, given during the early part of the course, tells of the relations between the President, Secretary of War and Chief of Staff in regard to military matters; the organization of the Staff is outlined; the Department is sketched in detail. Territorial Departments and their military districts are mentioned, as are expeditions in training. Some information is given on the Amer. Exp. Forces. The organization of the entire army of the U.S. into its branches is discussed; then each branch is taken up and its various subdivisions explained. This lecture introduces detailed tables of organization covering the various units. The Inf. Division is discussed in considerable detail.

10. MODERN WARFARE 11 hours.

The subject of Modern Warfare is divided into four topics; viz., (1) Trench warfare, (2) Foreign Armies, (3) Gas Warfare, (4) The Drill. Each is briefly explained in the following outline:-

a. Trench warfare - 6 hours.

Under this topic are taken up points such as nomenclature of the trenches, barrage in the trenches, methods of attack and defense, etc. Considerable detail is presented, with the view of giving the prospective aviator some idea of what the trenches are, even though he may never serve in them. In order that the work of the air service may be properly coordinated with that of infantry it is essential that the aviator understand the methods of warfare in the trenches. Trenches, Lines, Liquid fire, Poison Flighting, Raiding, Reconnaissance, Gas, Other Chemical agents are considered.

b. Foreign Armies - 1 hour.

A general discussion of British, French, Italian and German Armies is presented, on points of administration and organization. Similarities and differences are noted. Emphasis is placed on what we know of the air services of these armies - with special stress on the organization and general operation of the Royal Flying Corps.

c. Gas Defense - 3 hours.

Such subjects as history of gas warfare, early precautionary measures, methods of attack, identification of gases and gas shells, handling of casualties, etc. are discussed.

d. Gas Drill - 4 hours.

Four hours are put in on the drill field, under the supervision of the Medical Officer and assistants, in demonstrating and giving practice in the use of the gas mask under actual conditions of marching, etc. Time of putting on the mask is emphasized, special points of importance in its use, etc.

11. MORALE 1 hour.

The object of this lecture is primarily to create a good morale, esprit de corps, and general pride and confidence among the men of the American Air Service. Germany's war methods are discussed, as are also the German Aviation Service (not in detail of organization), the American Air Service, the qualities for success in aviation, part played by the individual, necessity of accuracy, etc., and the necessity of having absolute faith in the statement that Aviation will win the war.

g. Instruction - Special Points. It early devolved upon the Military Subjects Department to give instruction to the cadets on certain routine matters in the operation of the School that it was necessary for them to know immediately upon their arrival. A special lecture on the Organization of the School of Military Aeronautics was always included by this department. During this hour the Commandant gave a short address to every entering squadron and the balance of the hour was taken up with the distribution and explanation of instructional material and notes. These instructions include among other things instruction on how to obtain tool checks and how to use them, books desirable for use in the work, use of lecture notes, instructions governing examinations in all subjects, courtesy towards civilian instructors, copies of General Orders No. 1 of this school regarding the importance of not giving out any military information and General Orders No. 2 of this school calling attention to the importance of careful handling of tool checks. Copies of "Instructions to Cadets" and General Orders Nos. 1 and 2, together with list of personal equipment suggested to be taken to France are included in Appendix K1 .

c. Instruction - Special Points. It early devolved upon the
military Students Detachment to give instruction to the cadets on certain
routine matters. In the operation of the School that it was necessary for them
to know immediately upon their arrival. A special lecture on the Organization
of the School of Military Aeronautics was always included by this department.
During this hour the Commandant gave a short address to every entering squadron
and the balance of the hour was taken up with the distribution and explanation
of instructional material and notes. These instructions include among other
things instruction on how to obtain tool checks and how to use them, books
desirable for use in the work, use of lecture notes, instructions governing
examinations in all subjects, courtesy towards civilian instructors, copies
of General Orders No. 1 of this school regarding the importance of not giving
out any military information and General Orders No. 2 of this school calling
"Instructions to Cadets" and General Orders Nos. 1 and 2, together with list
of personal equipment necessary to be taken if troops are ordered in
Appendix II.

h. Instruction - Examinations. The method of conducting examinations by the Military Subjects Department and detailed instructions to instructors regarding the matters to be considered carefully in the examinations have been very well outlined by the Military Subjects Department in the report referred to above. While the essential steps outlined in this report on examinations have been followed by all departments, it is believed that the inclusion of this set of ru rules at this point will be of interest as showing the care exercised in properly conducting the examinations at this School. The following "Rules for Examinations" were taken from a report submitted by Lieut. Heffner on May 20, 1918, and following this set of Rules for Examinations are sample sets of questions given by the Military Subjects Department.

MILITARY SUBJECTS DEPARTMENT.

May 15, 1918.

RULES FOR EXAMINATIONS:-

The following rules will govern all examinations and test given by the Department of Military Subjects:

I. Schedule of examinations and tests -

The following is a list of examinations and tests to be given each week by the Military Subjects Department, under the present arrangement of the curriculum:

Squadron B - 15-minute test
" D - 1-hour preliminary exam.
" F - 15-minute test
" H - 1-hour preliminary exam.
" K - 2-hour final exam.

The hours for the two preliminary examinations and the final examination will be noted on the general schedule as posted on bulletin boards. The two 15-minute tests will be scheduled by this Department at some suitable lecture hour during the early part of the week. A schedule of hours at which these tests and examinations will be given during the week will be prepared each week by the instructor in charge of examination work. One copy shall be submitted to the Head of the Department for approval; one copy to the Office of the President, Academic Board; and one copy to each instructor scheduled to give an examination or test. The complete schedule of tests and examinations should be ready and copies distributed as above by Monday noon of each week.

II. Questions and Answers -

a. Preparation of questions -

The instructor in charge of examination work will secure from each member of the Department a set of questions covering the subjects on which he lectures. Such questions will be divided into three classes:-

RULES FOR EXAMINATIONS:-

The following rules will govern all examinations and tests given by the Department of Military Subjects:

I. Schedule of examinations and tests -

The following is a list of examinations and tests to be given each week by the military department, under the present arrangement of the curriculum:

Squadron B - 15-minute test
" C - 1-hour preliminary exam.
" D - 15-minute test
" E - 1-hour preliminary exam.
" F - 1-hour final exam.

The hours for the two preliminary examinations and the final examinations will be noted on the general schedule as posted on bulletin boards. The 15-minute tests will be conducted by the Department on some suitable morning during the early part of the week. A schedule of hours or night hour tests and examinations will be given during the week. Will be prepared each week by the instructor in charge of examination work. One copy shall be submitted to the Head of the Department for approval; one copy to the typist of the Department, Lessons Typist; and one copy to each instructor scheduled to give an examination or test. The complete schedule of tests and examinations should be ready and copies distributed as above by Monday noon of each week.

II. Questions and Answers -

a. Preparation of questions -

The instructor in charge of examination work will secure from each member of the Department a set of questions covering the subjects or phases he lectures. Such questions will be divided into three classes:-

(1) Suitable for preliminary exam. in D Squadron
(2) " " " " " H "
(3) " " final " " K "

No separate set of questions for 15-minute tests need be prepared, but suitable questions may be selected from lists of those suitable for preliminary (or even final) examinations. In some cases one set of questions may suffice for two or more of these classes of examinations and tests.

b. Answers -

In all cases complete answers should be furnished by the instructors submitting the questions. Answers to questions will be prepared on separate sheets. They will be numbered in accordance with the numbering of the questions, and copies thereof will be filed with the questions.

c. Selection of questions -

The instructor in charge of examination work will select from the questions submitted to him sets of questions to be used in all examinations and tests, such sets to be compiled in accordance with the following plan:

15-minute tests - 3 questions of not more than 2 parts each,
Preliminary exams - 10 questions of not more than 2 parts each,
Final exams - 10 questions of not more than 3 parts each.

The questions given in preliminary and final examinations will be divided into groups covering the general topics discussed in lectures of the Department. The plan is to give a topic the same relative proportion of the total number of questions as the number of hours of lecture work in that topic bears to the total number of hours lecture work. The following allotments of questions for final examinations have been figured out and appear to be consistent with the general plan. The same idea will be carried out as far as practicable in preliminary examinations:-

Subject	FINAL EXAMINATION Number Questions	Parts per Question
Modern Warfare (inc. Gas)	1	3
Admin. & Org. U.S. Army	1	2
Regulations	1	3
Law (inc. Arts. of War)	1	3
Paper Work (inc.Correspondence)	2	2
Infantry Drill) Guard Duty)	1	3
Courtesy	1	2
Hygiene & First Aid	1	2
Discipline) Morale)	1	2
	10	

In all cases complete answers should be furnished by the on separate sheets. They will be numbered in accordance with the numbering of the questions, and copies thereof will be filed with the questions.

c. Selection of questions -

The instructor in charge of examination work will select from and tests, such sets to be compiled in accordance with the following plan:

15-minute tests	- 3 questions of not more than 2 parts each,
Preliminary exams	- 10 questions of not more than 2 parts each,
Final exams	- 10 questions of not more than 3 parts each.

The questions given in preliminary and final examinations will be divided into groups covering the general topics discussed in lectures of the Department. The plan is to give a topic the same relative proportion of the total number of questions as the number of hours of lecture work in that topic bears to the total number of hours lecture work. The following allotments of questions for final examinations have been figured out and appear to be consistent with the general plan. The same idea will be carried out as far as practicable in preliminary examinations:-

	FINAL EXAMINATION	
	Number questions	Parts per question
Modern Warfare (inc. Gas)	1	3
Admin. & Org. U.S. Army	1	2
[illegible]	1	2
[illegible] (inc. Arty.)	1	2
Paper Work (inc.Correspondence)	2	2
Infantry Drill)		
[illegible]	1	2
Courtesy	1	2
Hygiene & First Aid	1	2
Discipline)		
[illegible])	1	2
	30	

All sets of examination questions will be prepared in triplicate. One copy, accompanied by a set of answers, will be submitted to the Head of the Department and after having been approved will be mimeographed (if for a preliminary or final examination) and copies given to the instructor who is scheduled to be present at the examination or test. The second and third copies of the questions and answers will be filed as explained elsewhere in these instructions.

d. Records of questions -

It will be necessary to keep two record files of all questions used, as follows:

(1) Lists of questions given at each test or examination to any particular squadron during its stay in the School in order that the same question may not be given to any one squadron in more than one examination or test. Records of questions to any one squadron during their stay in the school may be kept by simply attaching copies of tests and examinations to the file prepared for that particular squadron.

(2) Lists of questions given in each examination; for instance, preliminary in D week, preliminary in H week, final in K week. This is necessary in order that the same question may not occur too frequently as a part of any examination given in a certain week. If a question is given to K squadron in a final examination on a particular day it should not be given to another K squadron in a final examination for a period of at least 6 to 8 weeks, or longer if possible. Records of questions given any particular week should be kept in a tabulated form, a sample of which is here shown:-

	Week ending Saturday		
	May 18	May 25	etc.
	D H K	D H K	
1. Question	Xb		

Entries should be made as noted each week. For instance, the entry above indicates that the questions written out on the sheet was given as part (b) of question X to Squadron H during the week ending May 18th. It is thus possible to determine when the question may safely be used again, if sodesired.

III. GRADING THE PAPERS -

All examinationsand tests will be graded according to the following scale:

d. Records of questions -

It will be necessary to keep two record files of all questions used, as follows:

(1) Lists of questions given to any one squadron during its stay in the School in order that the same question may not be given to any one squadron in more than one examination or test. Records of questions to any one squadron during their stay in the school may be kept by simply attaching copies of tests and examinations to the file prepared for that particular squadron.

(2) Lists of questions given in each examination; for instance, preliminary in D week, preliminary in H week, final in K week. This is necessary in order that the same question may not occur too frequently as a part of any examination given in a certain week. If a question is given to K squadron in a final examination on a particular day it should not be given to another K squadron in a final examination for a period of at least 6 to 8 weeks, or longer

should be kept in a tabulated form, a sample of which is here shown:-

		May 18	May 25	etc.
		D H K	D H K	
1. Question	Xb			

Entries should be made as noted each week. For instance, the entry above indicates that the questions written out on the sheet was given as part (b) of question X to Squadron H during the week ending May 18th. It is thus possible to determine when the question may safely be used again, if desired.

(2). Grading of papers -

All examinations and tests will be graded according to the following

scale:

90-100	VG
75-89	G
65-74	F
60-64	F-
50-59	P
0-50	M

In all cases both percentage and letter of grading will appear in the upper right corner of the paper.

Copies of questions accompanied by copies of answers will be given to each instructor who is to grade examinations or tests. Each question will have marked opposite it the number of credits to be allowed for a correct answer. The credits allowed for the correct answer should also appear on the copies which are sent to Washington and to the office of the president of Academic Board.

IV. RECORDING THE GRADES -

a. Statement to appear on all grade sheets.

On all sheets used to record grades of any test or examination must appear the statement:

"All cadets present handed in papers".

These statements play an important part in the proceedings of the Discharge Board and must not be omitted.

b. Preliminary exams and 15-minute tests.

Preliminary exams and 15-minute tests will be recorded by letter grades only, as VG, G, etc. Reports of preliminary examinations and 15-minute tests will be made on ordinary grade sheets, in duplicate, both copies to go to the Head of the Department for approval, after which one goes to the office of the President, Academic Board, and the other to file.

In cases of preliminary examinations and 15-minute tests where more than one-third of the total number of men in the class fail, the grades should be proportionately raised until the number of failures is decreased to not more than one-third. This procedure should be taken to eliminate irregularities of instruction or grading of papers which may occur.

c. Final examinations.

Final examinations will be recorded in percentage, on final examination grade sheets, with each question separately recorded and the total figured. Before typewriting grades

Copies of questions accompanied by copies of answers will be given the upper right corner of the paper.

Copies of questions accompanied by copies of answers will be given have marked opposite it the number of credits to be allowed for a correct answer. The credits allowed for the correct answer should also appear on the Academic Board.

c. Statement to appear on all grade sheets.

On all sheets used to record grades of any test or examination must appear the statement:

These statements play an important part in the proceedings of the Discharge Board and must not be omitted.

b. Preliminary exams and 15-minute tests.

Preliminary exams and 15-minute tests will be recorded by letter grades only, as VG, G, etc. Reports of preliminary examinations and 15-minute tests will be made on ordinary grade sheets, in duplicate, both copies to go to the Head of the Department for approval, after which one goes to the office of the President, Academic Board, and the other to file.

In cases of preliminary examinations and 15-minute tests where more than one-third of the total number of men in the class fail, the grades should be proportionately raised until the number of failures is decreased to not more than one-third. This procedure should be taken to eliminate irregularities of instruction or grading of papers which may occur.

c. Final examinations.

Final examinations will be recorded in percentage, on final examination grade sheets, with each question separately recorded and the total figured. Before typewriting grades

on final examination the grade sheets should be submitted to the Head of the Department for approval, together with all papers bearing a mark below 65 and all bearing a mark of 90 or above. Final examination grade sheets will be prepared in triplicate and will be accompanied by three copies of Analysis of Examinations, form S.35.

The single grade sheet will be kept for the Department files. The two double sheets, with copies of the questions on the inside sheet, will accompany the corrected papers to the Office of the President, Academic Board, after having been approved by the Head of the Department. One copy of the double sheet should be marked at the top "Copy for the Examining Board" and should be fastened to the file of completed papers by means of a clip. The other copy of the double sheet will be attached to the papers by means of a string running through a hole punched through the entire file, in the upper left-hand corner of the papers. This file of papers with the grade sheet will be forwarded to Washington.

V. REPORTING THE GRADES.

All papers must be graded and all reports completed and turned over to the Head of the Department for approval by 9:00 A.M. on Friday of each week, without fail.

VI. SUMMARIZED DUTIESOF INSTRUCTOR IN CHARGE.

In brief the duties of the instructor in charge of examination work are as follows:

1. Submit copies of schedule of examinations to Head of Department and to other persons mentioned, not later than Monday noon of each week.

2. Prepare sets of questions and submit to Head of Department not later than 24 hours before the examination or test at which the questions are to be given.

3. Attend to distribution and collection of papers for grading, noting on sheets number of credits to be allowed for each question.

4. Attend to the recording of grades and statements concerning men present not handing in papers, etc.

5. Submit grades and papers (extra poor and extra good) to Head of Department by 9:00 A.M. on Friday of each week. Submit also Analysis of Examinations for final exams.

6. File and record questions as prescribed.

7. File copies of grade sheets.

[illegible] examination the grade sheets should be submitted to the Head of the Department for approval, together with all papers [illegible] a copy of the [illegible] Final examination papers will be prepared in duplicate and will be accompanied by three copies of Analysis of Examinations, form S.35.

The single grade sheet will be kept for the Department files. The two double sheets, with copies of the questions on the inside sheet, will accompany the corrected papers to the Office of the President, Academic Board, after having been approved by the Head of the Department. One copy of the double sheet should be marked at the top "Copy for the Examining Board" and should be fastened to the file of completed papers by means of a clip. The other copy of the double sheet will be [illegible] to the paper by means of a string running through a hole punched through the entire file, in the upper left-hand corner of the paper. This file of papers with the grade sheet will be forwarded to Washington.

V. [illegible]

All papers must be graded and all reports completed and turned over to the Head of the Department for approval by 9:00 A.M. on Friday of each week, without fail.

VI. SUMMARIZED DUTIES OF INSTRUCTOR IN CHARGE.

In brief the duties of the instructor in charge of examination work are as follows:

1. Submit copies of schedule of examinations to Head of Department and to other persons mentioned, not later than Monday noon of each week.

2. Prepare sets of questions and submit to Head of Department not later than 24 hours before the examination or test at which the questions are to be given.

3. Attend to distribution and collection of papers for grading, noting on sheets number of credits to be allowed for each [illegible].

4. Attend to the recording of grades and statements concerning men present not handing in papers, etc.

5. Submit grades and papers (extra poor and extra good) to Head of Department by 9:00 A.M. on Friday of each week. Submit also Analysis of Examinations for final exams.

6. File and record questions as prescribed.

7. File copies of grade sheets.

FINAL EXAMINATION QUESTIONS. SQUADRON C-40. MARCH 14, 1918.

MILITARY STUDIES DEPT.

Graduating date:
April 27, 1918.

1. (a) Beginning with the offense, name the steps to be taken in the prosecution of an enlisted man for the theft of a pistol. (b) What type of Court Martial would try the above case? (c) Under what conditions are civilians accompanying troops subject to Military Law?

2. (a) Give the following information for the Special Court Martial: (1) Appointing authorities, (2) Number of members, (3) Limits of jurisdiction, (4) Limits of punishment. (b) Explain what is included in the order appointing or convening a general Court Martial. (c) By what persons must the death sentence, given by a General Court Martial, be approved, in time of war?

3. (a) What are the main features which differentiate a howitzer from a field gun? (b) Name several advantages of not making front line trenches in straight lines. (c) What is a trench parapet? (d) What is the enlistment period in the British Army and how is it divided?

4. (a) Name five of the more important duties of the General Staff. (b) Show by diagram, the relationship between the following: (1) Chief of the Coast Artillery Corps, (2) Militia Bureau, (3) Coast Artillery Districts, (4) Chief Signal Officer, (5) Surgeon General, (6) Adjutant General, (7) Chief of Staff.

5. (a) Answer the following questions concerning the Officers' Reserve Corps: (1) What is its purpose? (2) From what source does it obtain its members? (3) What are the requirements for a commission? (4) In what grades are commissions issued? (5) What is the term of the commission? (6) What rules govern promotion in both peace and war time?

6. (a) Give briefly the regulations which govern the actions of an enlisted man when passing the uncased colors, under all conditions for which such action is prescribed. (b) Explain how "colors" differ from "standards". (c) What is the National Salute?

7. (a) What channels of communication are prescribed between a Cadet in this School and the Chief Signal Officer with regard to a question of discipline? (b) How would the brief of the letter and envelope be addressed in the above case? (c) Under what two conditions should your rank and organization follow your name in a Military Letter?

8. (a) What two statements appear in a requisition? (b) Give the statement which should appear on the first officer's pay voucher that you submit. (c) There are four types of blank pages in the Guard Report. Explain the use of each. (d) In a Military Post what Commanding Officers must keep a file of General and Special Orders. (e) When may an enlisted man draw his deposits?

9. Explain briefly the following points concerning the travel of an officer on duty without troops: (a) In changing station from Berkeley to New York who would issue the orders? (b) What statement must be included in the order to make it valid for the issuing of transportation or commutation therefor? (c) Give two methods by means of which an officer may secure transportation or its commutation.

10. (a) What are the requirements for the rating of Junior Military Aviator. (b) What insignia does a Junior Military Aviator wear to distinguish him from other officers? (c) Give three different commands which will change the formation of a squadron from line to column of squads. (d) Mention several carriers of typhoid fever.

April 27, 1918.

Final Examination
Military Subjects Department.

Squadron K-51. Week ending July 22, 1918.

1. (a) What are five regulations governing the granting of leave of absence to officers?
(b) What is a warrant?
(c) How are general officers promoted?

2. (a) What allowances are granted to 2nd Lieutenants in addition to their base pay?
(b) What is the maximum length of time for which the commander of a tactical division may grant a leave of absence?
(c) What procedure should be followed when a leave is obtained?

3. (a) Distinguish between the terms accountability and responsibility.
(b) Discuss the duties of the commanding officer, first sergeant, supply sergeant and clerks with regard to the paper work of a company office.

4. (a) Explain briefly the method of arrest and control of hemorrhage.
(b) Name six important communicable diseases.
(c) Differentiate between sprains and fractures.

5. (a) Name four classes of officers who are not elegible to serve upon Courts Martial.
(b) Name the three kinds of special pleas that may be entered at trial before Court Matrial, and illustrate each.
(c) Who administers the oath to the Judge Advocate of a Court Martial?

6. (a) Give all the insignia worm by a colonel of cavalry in the National Army.
(b) Give the grades of officers in the Navy which correspond tothe four highest grades of officers in the Army.
(c) Differentiate between rank and grade.

7. (a) What is meant by enfilade fire?
(b) What is the nature of the use of liquid fire?
(c) Name three conditions which should be observed in making machine gun emplacements.

8. (a) Name four ways of detecting a gas cloud attack.
(b) What are the duties of special non-commissioned gas officers?
(c) Name four special uses of the gas shell.

9. (a) What do you understand by the "MORALE" of a body of troops.
(b) Write a short paragraph on discipline and its importance.
(c) Give the two special orders for sentinels at the post of the guard.

10. (a) Give five classes of persons subject to military law.
(b) Private Jones, with the U.S. forces on the border, becomes tired of service, and decides to desert and go to Mexico. Private Smith supplies him with money, and with a boat in which to cross the Rio Grande. Is Private Smith guilty of any offense under the Articles of War? If so, of what offense?
(c) Private Jones later returns to the United States, and enlists in the Army under an assumed name. He is assigned to the command of Captain Brown, who knows

regard to the paper work of a company office.

Court material, and illustrate each.
(c) Who administers the oath to the Judge Advocate of a court martial?

7. (a) Give all the insignia worn by a colonel of cavalry in the National Army.
(b) Give the grades of officers in the Navy which correspond to the four
(c) Differentiate between rank and grade.

7. (a) What is meant by enfilade fire?
(b) What is the nature of the use of liquid fire?

8. (a) Name four ways of detecting a gas cloud attack.
(c) Name four special uses of the gas shell.

money, and with a boat in which to cross the Rio Grande. Is Private Smith guilty of any offense under the Articles of War? If so, of what offense?
(c) Private Jones later returns to the United States, and enlists in the Army under an assumed name. He is assigned to the command of Captain Brown, who know

Private Jones, and also the circumstances detailed in part (b). Captain Brown takes no steps in the matter. Is the Captain guilty of any offense? If so, of what offense?

Final Examination
MILITARY SUBJECTS DEPARTMENT.

Squadron K-65. Week ending Nov. 2, 1918.

1. (a) Define the following terms: Traverse; revetment; parapet.
(b) What is an observation post?
(c) What is meant by enfilade fire?

2. (a) Give three advantages of the artillery bombardment preliminary to the infantry attack.
(b) Give two (2) conditions necessary to the success of mining operations at the front.

3. (a) What is a Coast Artillery District?
(b) List the Coast Artillery Districts of the United States.
(c) Give the two main subdivisions of a Coast Artillery District.

4. (a) Give three (3) reasons for which an officer of the Air Service may receive additional pay.
(b) List the reports required by the War Department upon the death of an enlisted man at post.

5. (a) What is "military government"?
(b) Explain the difference between arrest and confinement.
(c) What is meant by the "arraignment of the accused"?

6. (a) What is a General Court Martial order?
(b) Explain how the seating of the members of a General Court Martial is arranged.

7. Write a letter to the proper authority requesting a furlough of six (6) months.

8. (a) What is the "final statement"?
(b) How many copies of the final statement are prepared?
(c) What is the final disposition of the copy or copies?

9. (a) The company is in column of squads. In one command change to company in line moving in the same direction that the column faces.
(b) In your own language describe the execution of the command "RIGHT FACE".

10. (a) What conditions are necessary for a successful gas attack?
(b) How does the respirator protect against gas?

Week ending Nov. 2, 1918.

1. Traverse; revetment; parapet.

2. (a) Give three (3) reasons for the auxiliary dismountment practice in the
(b) Give two (2) qualifications necessary to the success of pillar
of the French.

3. (a) What is a Coast Artillery District?
(b) List the Coast Artillery Districts of the United States.
(c) Give the two main subdivisions of a Coast Artillery District.

4. (a) Give three (3) reasons for which an officer of the Air Service may
(b) List the reports required by the War Department upon the death of an
enlisted man at post.

5. (a) What is "military government"?
(b) Explain the difference between arrest and confinement.
(c) What is meant by the "arraignment of the accused"?

6. (a) What is a General Court Martial order?
(b) Explain how the seating of the members of a General Court Martial is

7. Write a letter to the proper authority requesting a furlough of six (6) months.

8. (a) What is the "final statement"?
(b) How many copies of the final statement are prepared?
(c) What is the final disposition of the copy or copies?

9. (a) The company is in column of squads. In one command change to company in line moving in the same direction that the column faces.
(b) In your own language describe the execution of the command "RIGHT FACE".

10. (a) What conditions are necessary for a successful gas attack?
(b) How does the respirator protect against gas?

8. SIGNALLING DEPARTMENT

a. General: The course in Signalling was designed to teach the International Morse code by means of key and buzzer so that cadets were able to send and receive sufficiently rapidly to meet the requirements of a military aviator. The course also included work in visual signalling and non-technical lectures on radio apparatus. With the exception of the last curriculum of October 14, 1918, practical instruction in Signalling extended throughout the entire length of the course. In the curriculum of October 14, 1918, the instruction in Signalling was condensed in the first three weeks of the course with only enough time devoted to it thereafter to keep the work up to the required standard.

This department has always been an accurate test of a man's mechanical ability to do the work, the final examination in both sending and receiving being a test of what he could actually do in these two branches of the work. Proper instruction has always required considerable practice in addition to the amount actually scheduled in the curriculum, this extra work being given at night in the barracks under the supervision of instructors.

b. Staff: First Lieutenant Robert R. McPherson was head of the Signalling Department from the time the School opened in May 1917 until its close on February 1, 1919. Lieutenant McPherson is an experienced radio man and it is believed that his work in the School here has reflected much credit upon him. The installation of the excellent signalling laboratories was made under his supervision. For instructors in this department the University was able to secure as a rule radio operators or radio mechanics and this has been an advantage in that it was not necessary to teach these men the code before they were in a position to be used. However, certain of the instructors have been trained in the School knowing nothing of the code before they started, it being possible to train them quickly to the point where they were able to give the necessary instruction.

The work in Signalling has usually been divided into two more or less distinct groups. Under the earlier curricula the work was divided into a Junior and Senior Wing, the Junior Wing being handled by a certain number of the staff and the Senior by the balance of theinstructional staff. Under the twelve weeks' course the work in Signalling was divided into two divisions and the staff organization to handle this work was divided as follows:

First division including squadrons "A" to "E" inclusive, three instructors, viz.:

N. W.McEachern
H. C. Silent
G. Street

Second division including squadrons "F" to "N" inclusive, fiveinstructors, viz.:

E. F. Perkins,
G. W. Cattel,
H. E. Fielder,
A. W. Fonseca,
R. A. Hall.

The above organization was for the month of May, 1918, and as there outlined the average hours of instruction required of each instructor was twenty-seven. A similar arrangement to the above has been in force throughout the twelve weeks' course, the personnel of the staff being somewhat different, however, from time to time.

Appendix Il furnished a complete list of the instructors who have served in the Signalling Department. From this appendix it will be noted that a total of fourteen men served on the staff of this department; of these ten were experienced radio operators or mechanics having had radio courses in various schools of the country. Of the fourteen instructors in this department eleven served as civilians throughout their entire period of service. The average length of service of instructors in the Signalling Department was 9.8 months, the highest of any department of the School.

c. Curriculum Requirements: In considering the curriculum requirements in the Signalling Department the curricula of the following dates only will be considered:

Curriculum of June 11, 1917
" " Nov. 1, 1917
" " Apr. 1, 1918
" " Oct. 14, 1918

The work scheduled under the curricula of September 26, 1917, and March 1, 1918, was slightly different but inasmuch as these curricula were almost immediately superseded the requirements under them will not be considered. The following table shows the hours required under the various sub-heads in the Signalling Department for the different curricula under which the School operated:

Several activities including summaries "A" to "M" inclusive, Aeronautics are, viz.:

L. F. Perkins,
C. W. Ostbel,
K. E. Fielder,
[illegible],
H. A. Hall.

The above organization was for the month of July, 1918, and as there actually the average hours of instruction required of each instructor, was twenty-seven, a similar arrangement as the above has been in force throughout the twelve weeks' course, the personnel of the staff being somewhat different, however, from time to time.

Appendix II furnished a complete list of the instructors who have served in the Aeronautics Department. From this appendix it will be seen that a total of fourteen men served on the staff of this department; of these ten were experimental radio operators or technicians having had radio courses in various schools of the country. Of the fourteen instructors in this department eleven served an aviation throughout their entire period of service. The average length of service of instructors in the Aeronautics Department was 8.2 months, the highest of any department of the School.

c. Curriculum requirements: In considering the curriculum requirements in the Aeronautics Department the curricula of the following dates only will be considered:

Curriculum of June 11, 1917
" " Nov. 1, 1917
" " Jan. 1, 1918
" " Oct. 14, 1918

The work scheduled under the curricula of September 26, 1917, and March 1, 1918, was slightly different but inasmuch as these curricula were almost immediately superseded the requirements under them will not be considered. The following table shows the hours required under the various sub-heads in the Aeronautics Department for the different curricula under which the School operated:

Instruction-Signalling.

TABLE NO. 10.

	Hours Required in Curriculum of							
	6/11/17	9/26/17	11/1/17	3/1/18	4/1/18	10- 14 - 18 Pilots	Bombers	Obs.
Signalling & Wireless								
Telegraphy (Elem)	18							
Radio	6							
Teleg. & Sig.	15							
Signalling & Radio								
Pract. Signalling (At least ½ hour daily.....		29	30					
Field Work		5	-					
Radio		3	3					
Examinations		3	2					
Signalling								
Practical				40	39	25	30	30
Radio Apparatus				2	2	2	2	2
Examination				2	2	2	2	2

The work in Signalling has consisted almost entirely of practice in the International Morse code by means of telegraph key with buzzer. A certain amount of visual signalling with panneau and blinkers has been included in the course, also a few non-technical lectures on radio equipment but the main work of the department has been instruction in the International Morse code and the final examination requirements in this department have always been based upon ability to send and receive so many words per minute before the work of the department could be considered as successfully completed.

Under the eight weeks' curriculum the required standard for graduation was the ability to send ten words per minute and receive eight words per minute. The curriculum of June 11, 1917, provided thirty-three hours practical instruction in Signalling with five hours lectures on radio apparatus. The eight weeks' curriculum of November 1, 1917, provided thirty hours in practical instruction with three hours lectures on radio apparatus.

Hours Required in Curriculum of

| | | |

Instruction-Signalling.

With the institution of the twelve weeks' course of April 1, 1918, the requirements in the Signalling Department were somewhat changed. A total of thirty-nine hours practical work was required and two lectures were to be given on radio apparatus. This course provided that of the thirty-nine hours, thirty-three were to be devoted to buzzer work, three hours to lamp signalling and three hours to the panneau. Stencil No. 157 in Appendix F5 outlines in considerable detail what was expected of the Signalling Department under the curriculum of April 1, 1918. For completing the course in Signalling cadets were required to be able to receive for two minutes at the rate of eight words per minute, five letters to a word, the passing mark to be sixty per cent. and six errors or more to count as a failure. In sending the cadets were required to be able to send for two minutes at the rate of eight words per minute, fiveletters to a word, a cadet making more than five mistakes to be counted as a failure. This curriculum, however, provided that the better men of the squadron should be given "passing out" tests at the rate of ten words per minute, which, if successfully completed, considered them as having passed the course in Signalling.

Under thecurriculum of Octob.14, 1918, the requirements for graduation consisted of ability to send eight words per minute and receive six words per minute with provision for "passing out" tests at the rate of eight words per minute as in the former curriculum. This curriculum provided twenty-five hours practical work in Signalling for Pilots, thirty hours for Bombers and thirty hours for Observers, in addition towhich there were two lectures on radio apparatus and two hours examination. Stencil No. 272 in Appendix F6 gives in detail the syllabus for the course in Signalling under the curriculum of October 14, 1918.

d. Laboratory Space and Equipment: When the School first opened in May, 1917, each cadet upon coming to the School was issued a dry cell, telegraph key and buzzer, this equipment being taken to the barracks for practice there and for some months this was the only laboratory equipment available for code practice.

For the lectures on Radio Apparatus and Theory of Wireless the Radio Laboratory of the Mechanics Department of the University was used. This laboratory was well equipped with radio apparatus and was used by the Signalling Department until equipment sent to the School had been properly installed in Room 2, Aeronautics Laboratory, later fitted up as a Signalling and Radio Laboratory.

Instructions - Signalling.

With the institution of the twelve weeks' course of April 1, 1918, the requirements in the Signalling Department were somewhat changed. A total of thirty-nine hours practical work was required and ten lectures were to be given on radio apparatus. This course provided that of the thirty-nine hours, thirty-three were to be devoted to buzzer work, three hours to lamp signalling and three hours to the pennant. Stencil No. 157 in Appendix F5 outlines in considerable detail what was expected of the Signalling Department under the curriculum of April 1, 1918. For completing the course in Signalling cadets were required to be able to receive for two minutes at the rate of eight words per minute, five letters to a word, the passing mark to be sixty per cent. and six errors or more to count as a failure. In sending the cadets were required to be able to send for two minutes at the rate of eight words per minute, five letters to a word, a cadet making more than five mistakes to be counted as a failure. This curriculum, however, provided that the better men of the squadron should be given "passing out" tests at the rate of ten words per minute, which, if successfully completed, counted them as having passed the course in Signalling.

Under curriculum of October 1, 1918, the requirements for graduation consisted of ability to send eight words per minute and receive six words per minute with provision for "passing out" tests at the rate of eight words per minute as in the former curriculum. This curriculum provided twenty-five hours practical work in Signalling for Pilots, thirty hours for Bombers and ninety hours for Observers, in addition to which there were ten lectures on radio apparatus and two hours examination. Stencil No. 272 in Appendix F6 gives in detail the syllabus for the course in Signalling under the curriculum of October 14, 1918.

a. Laboratory Space and Equipment: When the School first opened in May, 1917, each cadet upon coming to the School was issued a dry cell, telephone key and buzzer, this equipment being taken in the barracks for practice work and for some months this was the only laboratory equipment available for code practice.

For the lectures on Radio Apparatus and Theory of Wireless the Radio Laboratory of the Electrical Department of the University was used. This laboratory was well equipped with radio apparatus and was used by the Signalling Department until equipment sent to the School had been properly installed in Room 2, Barracks Laboratory, later fitted up as a Signalling and Radio Laboratory.

Instruction-Signalling.

The use of keys, buzzers and dry cells was very expensive, particularly the replacement of dry cells, and about September, 1917, arrangements were made to connect a key and a buzzer in series with one 110 volt lamp in each of the rooms at the Brick Barracks in which the cadets were living at that time. This eliminated dry cells as a source of power and considerably reduced the expense in this department.

Room No. 15 in the Aeronautics Laboratory and Room No. 2 were fitted up as Signalling Laboratories in the latter part of 1917, these rooms being fitted with what was known as the silent buzzer system. In November, 1917, the School was using for the source of power in the Aeronautics Laboratory a small 500 cycle motor-generator set. This set had sufficient capacity so that as the load was put on it no change in tone was noticeable and it gave a clear note easy to receive. In December, 1917, the main Signalling Laboratory, having a capacity of 240 men, was installed in "C" barracks. This laboratory contained four rows of tables, each row containing five tables and each table having seating capacity for twelve men. Two head phones and two keys were connected in series for each pair of men at each table. By certain combinations of switches it was possible for 180 men to be working in pairs at the same time, while at another row of tables 60 men could be receiving from an instructor. The source of power for this laboratory was a 1/8 K. W. 500 cycle motor-generator set. The noise and confusion in this laboratory with 240 men working at the same time was practically negligible inasmuch as the silent code system was there installed. The picture on page 117 shows the interior of this room with cadets working there and the picture on page 118 shows the motor-generator set used as a source of power in this laboratory.

With the installation of campus barracks units in the early months of 1918 arrangements were made for installing Signalling Equipment for accommodating from 50 to 70 men in the rear of each of these units, a similar silent code system being installed in each case. The picture on page 119 shows the general arrangement of the Signalling equipment in one of the smaller barracks units. The main Signalling Laboratory in the Aeronautics Laboratory was installed originally in Room No. 4 in the latter part of 1917. Early in 1918 rooms 2 and 4 were united and a silent code system installed with a capacity of 80 men. This room also contained such equipment as was necessary for the lectures on Radio Apparatus. The picture on page 120 shows the interior of Room No. 2, Aeronautics Laboratory, with a squadron at work on signalling apparatus, and the picture on page 121 shows part of the equipment and diagrams used in the non-technical lectures on Radio Apparatus.

Instruction-Signalling.

The use of keys, buzzers and dry cells was very expensive, particularly the replacement of dry cells, and about September, 1917, arrangements were made to connect a key and a buzzer in series with one 110 volt lamp in each of the rooms at the Brick Barracks in which the students were living at that time. This eliminated dry cells as a source of power and considerably reduced the expense in this department.

Room No. 18 in the Aeronautics Laboratory and Room No. 2 were fitted up as Signalling Laboratories in the latter part of 1917, these rooms being fitted with what was known as the silent buzzer system. In November, 1917, the School was using for the source of power in the Aeronautics Laboratory a small 500 cycle motor-generator set. This set had sufficient capacity so that as the load was put on it no change in tone was noticeable and it gave a clear note easy to receive. In December, 1917, the main Signalling Laboratory, having a capacity of 240 men, was installed in "U" Barracks. This laboratory contained four rows of tables, each row containing five tables and each table having seating capacity for twelve men. Two head phones and two keys were connected in series for each pair of men at each table. By certain combinations of switches it was possible for 180 men to be working in pairs at the same time, while at another row of tables 60 men could be receiving from an instructor. The source of power for this laboratory was a 1/8 K. W. 500 cycle motor-generator set. The noise and confusion in this laboratory with 240 men working at the same time was practically negligible inasmuch as the silent code system was there installed. The picture on page 117 shows the interior of this room with cadets working there and the picture on page 118 shows the motor-generator set used as a source of power in this laboratory.

With the installation of campus barracks units in the early m nths of 1918 arrangements were made for installing signalling equipment for accommodating from 50 to 70 men in the rear of each of these units, a similar silent code system being installed in each case. The picture on page 119 shows the general arrangement of the Signalling equipment in one of the smaller barracks units. The main Signalling Laboratory in the Aeronautics Laboratory was installed originally in Room No. 4 in the latter part of 1917. Early in 1918 rooms 2 and 4 were united and a silent code system installed with a capacity of 80 men. This room also contained such equipment as was necessary for the lectures on Radio Apparatus. The picture on page 120 shows the interior of Room No. 2, Aeronautics Laboratory, with a squadron at work on signalling apparatus, and the pictures on page 121 show part of the equipment and diagrams used in the non-technical lectures on Radio Apparatus.

Plate No. 6 - Main Signalling Laboratory - C Barracks - capacity 240 men.

Plate No. 7 - 1/8 km Motor Generator Set - Source of power for silent code practice system in C. Barracks.

Plate No. 8 - Signalling Laboratory in one of Campus Barracks Units. Same arrangement in all Campus Barracks.

Plate No. 9 - Radio and Signalling Laboratory - Room 2.

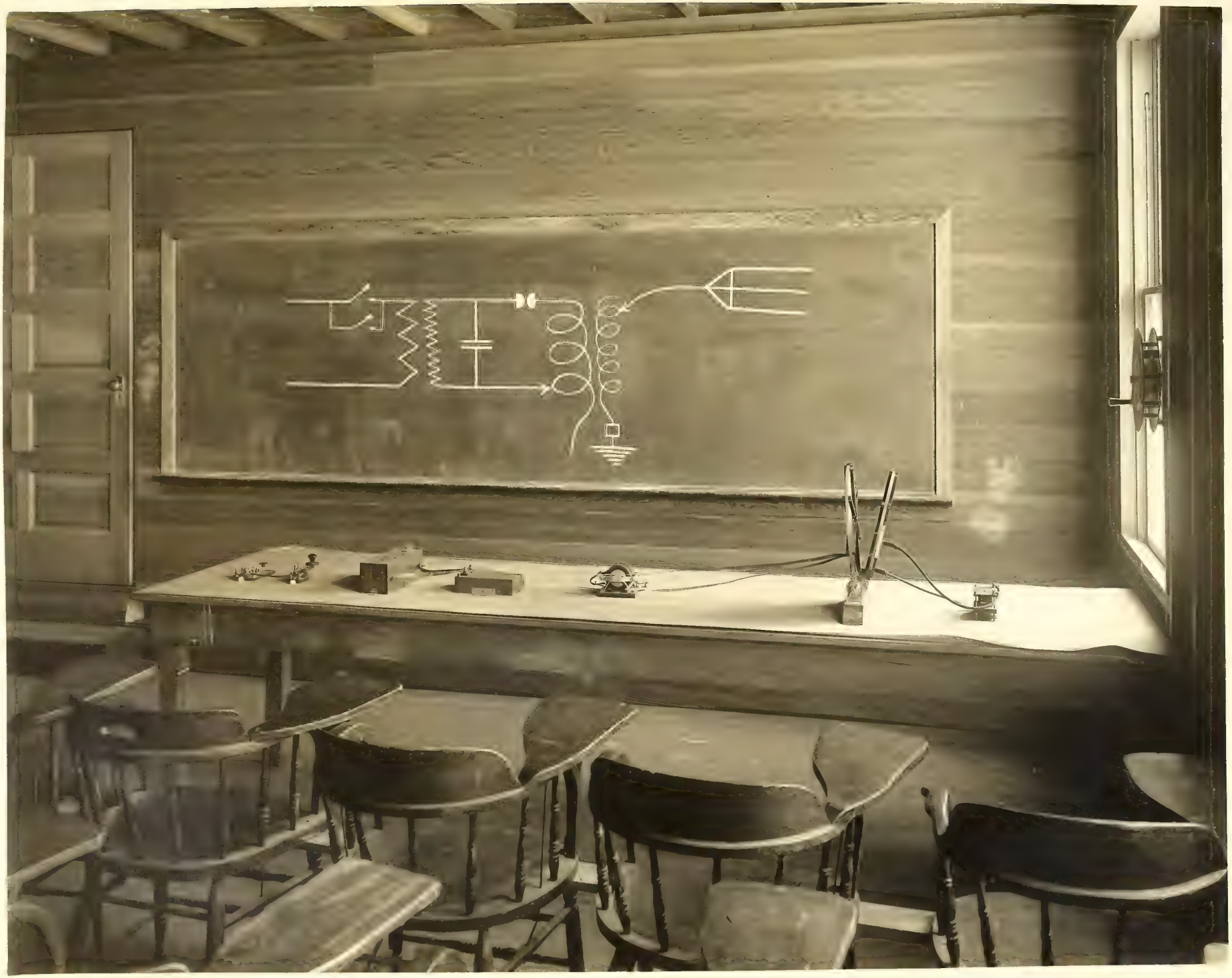


Plate No. 10 - Lecture equipment in Radio Laboratory - Room 2.

Instruction-Signalling.

B. Instruction-Sending and Receiving: The key note of instruction in the Signalling Department has been constant practice under careful supervision of competent instructors. In addition to the hours scheduled in the curriculum for Signalling Practice, cadets in this School have always been required to devote a part of their evening study time to Signalling practice. Sufficient laboratory capacity has always been available so that this could be done, also these laboratories have always been available during the day time so that cadets could practice at any time they saw fit.

With the system of instruction adopted at this School it has been possible for one instructor to handle as many as forty to fifty cadets in Signalling after the first few hours of training. Instruction in "C" barracks for the larger squadrons always required at least two instructors for each squadron. The course has been so arranged that the first division, consisting of squadrons doing primarily sending practice, has been handled in "C" barracks, and the second division, consisting of squadrons devoting their time largely to receiving, has been handled in Room No. 2 Aeronautics Laboratory.

The proper method of holding a key has been one of the first points on which instruction was necessary. The key is grasped lightly between the thumb and two first fingers, as shown in the picture on page 123 . Sending has been taught by what is known as the free arm and loose wrist movement. The elbow should rest freely upon a table and the fingers grasp the key as shown in the picture above referred to. By resting the elbow on the table any tendency of the cadet to work the arm up and down or to draw the arm back when depressing the key is eliminated. After the cadet had perfected the free arm and loose wrist movement with the elbow resting on the table he can send without support for the elbow, which is necessary for operation in an airplane.

Receiving is taught entirely by sound. The cadets are discouraged from attempting at first to learn the code as so many dots and dashes. It has been found that certain letters and numerals are more difficult to receive than others and groups have been made, based on the errors made by the cadets, separating the letters and numerals into three sets as shown below. The first group contains characters easiest to be received, the second group contains characters more difficult and the third group contains characters which have proved to be hardest to receive.

Group 1. T, M, O, C, A, N, O, 9, E, I, R, K, D.

Group 2. P, X, F, 8, L, 2, U, G, S. W. Y. Q.

Group 3. B, 3, 7, H, V, 5, 6, 4, 1, J, Z.

By devoting a comparatively larger amount of time to groups two and three the difficulty ordinarily experienced in teaching receiving has been largely reduced. The above segregation of characters is, of course, fairly approximate but from the records of the examinations and weekly quizzes the errors made have been segregated and the above groups have been based largely upon the results of these tests.

Instruction-signalling.

8. Instruction-sending and receiving. The key rose of instruction in the signalling department has been practice under careful supervision of competent instructors. In addition to the hours scheduled in the curriculum for signalling practice, cadets in this school have always been required to devote a part of their evening study time to signalling practice. Sufficient laboratory capacity has always been available so that this could be done, also these laboratories have always been available during the day time so that cadets could practice at any time they saw fit.

With the system of instruction adopted at this school it has been possible for one instructor to handle as many as forty to fifty cadets in signalling after the first few hours of training. Instruction in "C" barracks for the larger squadrons always required at least two instructors for each squadron. The course has been so arranged that the first division, consisting of squadrons doing primarily sending practice, has been handled in "C" barracks, and the second division, consisting of squadrons devoting their time largely to receiving, has been handled in Room No. 2 Aeronautics Laboratory.

The proper method of holding a key has been one of the first points on which instruction was necessary. The key is grasped lightly between the thumb and two first fingers, as shown in the picture on page 123 . Sending has been taught by what is known as the free arm and loose wrist movement. The elbow should rest freely upon a table and the fingers grasp the key as shown in the picture above referred to. By resting the elbow on the table any tendency of the cadet to work the arm up and down or to draw the arm back when depressing the key is eliminated. After the cadet had perfected the free arm and loose wrist movement with the elbow resting on the table he was asked without support for the elbow, which is necessary for operation in an airplane.

Receiving is taught entirely by sound. The cadets are discouraged from attempting at first to learn the code as so many dots and dashes. It has been found that certain letters and numerals are more difficult to receive than others and groups have been made, based on the errors made by the cadets, separating the letters and numerals into three sets as shown below. The first group contains characters cadets to be received, the second group contains characters more difficult and the third group contains characters which have proved to be hardest to receive.

Group 1. T, M, O, C, A, N, O, 9, E, I, R, K, D.

Group 2. P, X, T, 8, L, 2, U, C, S. W. Y. Q.

Group 3. B, 3, 7, H, V, 5, 6, 4, J, 1, Z.

By devoting a comparatively larger amount of time to groups two and three the difficulty ordinarily experienced in learning receiving has been largely reduced. The above segregation of characters is, of course, fairly approximate but from the records of the examinations and weekly quizzes the errors made have been segregated and the above groups have been based largely upon the results of these tests.

Plate No. 11 - Proper method of holding key.

Instruction-Signalling.

Instruction in visual signalling has always been given toward the end of the course inasmuch as at that time the cadets were familiar with the code and instruction in visual signalling required very little additional effort in order to complete the requirements of four words per minute as laid down in the curriculum.

f. Instruction- Radio Lectures: In the earlier curricula the lectures in this department included a certain amount of theory as well as explanations of radio apparatus. Later, however, the theoretical instruction was eliminated entirely, the lectures being devoted entirely to radio apparatus. The syllabus on Signalling included as Appendix K2 , which was furnished to the cadets gives an outline of the lectures given and also a fairly complete outline of the method followed in sending and receiving instruction, including method of holding the key, arm and wrist motion, difficulties encountered with the various types of characters, etc.

g. Instruction- Examinations: The examinations in the Signalling Department have always been conducted as directed in the various curricula. Sending and receiving sentences have included all letters of the alphabet and of course made up in code form consisting of the requisite number of words and units. For example, at one time the regulations directed that sentences should consist of forty letters being equivalent to eight words of 280 units. In addition to the final examination weekly tests have always been necessary to keep a careful check on the progress of the men each week. The percentage of failures in the Signalling Department has been small. Sample final examinations given in the Signalling Department are furnished on the following pages.

Instruction-Signalling.

Instruction in visual signalling has always been given toward the end of the course inasmuch as at that time the cadets were familiar with the code and instruction in visual signalling required very little additional effort in order to complete the requirements of four words per minute as laid down in the curriculum.

f. Instruction- Radio Lectures: In the earlier curricula the lectures in this department included a certain amount of theory in regard to applications of radio apparatus. Later, however, the theoretical instruction was eliminated entirely, the lectures being devoted entirely to radio apparatus. The syllabus on Signalling included as Appendix XZ , which was furnished to the cadets gives an outline of the lectures given and also a fairly complete outline of the method followed in sending and receiving instruction, including method of holding the key, correct wrist motion, difficulties encountered with the various types of characters, etc.

g. Instruction- Examinations: The examinations in the Signalling Department have always been conducted as directed in the various curricula. Reading and receiving examinations have included all letters of the alphabet and of course made up in code form consisting of the requisite number of words and write. For example, at one time the regulations directed that sentences should consist of forty letters being equivalent to eight words of 280 units. In addition to the final examination weekly tests have always been necessary to keep a careful check on the progress of the men each week. The percentage of failures in the Signalling Department has been small. Sample final examinations given in the Signalling Department are furnished on the following pages.

Final Examination in Wireless.

Squadron "H"-31 Feb. 20, 1918.

Receiving Sentences.

1) jhm 5tiwyu zar6 xs Lempdqfw sku4r eoyb fnLgilc2,

2) rOzdt gsdz rxb3qf cLr vaef7ny 8Lvn mjpaw9 koeiu.

Sending Sentences.

zeb7 9hxnsz uk2 qjyh8eO if pu5x36vw 4bLt pkl4cv agcdw mg5rL xuL wm7sLx8 e4 pzl64tky vnOp j9vf5z kcu rhbgwdo 32aq gb5ich w214rO g35d oakzn 74fk6q sxyjbc5m tz cvphL8 dishes xab kei9.

Final Examination in Wireless.

Squadron "H-37 April 4, 1918.

Receiving Sentence.

kqzw u4onfb irsmd 2ysvc hy5mlp Lafu jit6xcw eqL

L3hcd rOwvo gLvi7m xjuy q8xsnaf e9b pedazrnt kf.

Practice Sending Sentence.

baxfo pyjku 521r84 whmr OdvsLiq 6en ctai3g79 zu

7Ounilro 3o brajvc5 w64 qyuahg 8L9z xkpts edfm2

Sending Sentence.

p2Oyzw amqk rtv8cna 41x 6r9duLoh i3 7e5grjx sfb

o2 pysrkien 3dx w4ujar9 zhm5 7qo6Lf 1b8vt gOauc.

FINAL EXAMINATION IN SIGNALLING. SQUADRON M-59

October 3, 1918.

Receiving.

Practice:

EG5YU MGY6N DZH PA4IFJT XJ1BVW CKVR SL QUFON2HR

QVJ8OM ZKP7 KDHY9 NFRNX DIARC3NB XE GSY LOTANWL

Examination Section 1:

ON7 YIM6ACL DVSRQX CFPT DAOZJ G4WPH JTEBU2MI FK

SEZU5IBM TL YQSKNW9 DJZ UKIL VPR3NX WDHAF G8OCN.

Examination Section 2:

ZD ME6YROAP XW2Q AVOBH4 IFK CNAUG5L GUQWS BTIMJ

DNGFMOZ IQT JEYWRX 3APL XBKC9 NRUVA T8NKHLOS 7D.

Sending.

Practice:

QHV 3TRLGIK S6 DI4FJNY7 1WXMP EUOB8 ZF9C OAU5A2

Examination:

5YFH 3ROCV9 L2YG8 OZBNY 7T SQK4AEWU JM6CFDI XP1

L3WQY PZX4K ADRGUBX 7RJ 5DNP8S T2FI 6M H9EOCO1V

R7 AH9FJZ5L COY4 WXBI6V IA8 QDAOEP2 GSNK3 1UMOT.

Instruction - Gunnery

9. Gunnery Department:

a. General: The work of the Gunnery Department has in general covered instruction in the Lewis, Marlin and Vickers machine guns and has at various times included lectures on Bombs and Aerial Tactics. The infantry type of gun was used for several months until the airplane type was available. The method of instruction in machine guns has been almost entirely by laboratory work, where the student handled the gun constantly in stripping and stoppage work, this work in the laboratory being supplemented at times by stoppage firing and target firing on the 25 yard range. During the latter months of the school, the lectures on Bombs and Aerial Tactics were omitted from the Gunnery course. Trap Shooting has also been handled by the Gunnery Department during the entire time that Trap Shooting has been given, although for some months it was scheduled as a part of the Sports program.

The length of the course of instruction in Gunnery has varied somewhat under the different curricula. Originally, in the curriculum of June 11, 1917, the plan was to have instruction in Gunnery extend throughout the entire course. In the eight weeks curriculum of November 1, 1917, instruction in Gunnery totaled fifty hours and extended throughout the entire eight weeks' course. In the twelve weeks' course, revised curriculum of April 1, 1918, instruction in Gunnery amounted to fifty-two hours, beginning in the third week and extending through the balance of the course. In the October 1918 revision of the twelve weeks' curriculum the Gunnery course for Pilots amounted to sixty-two hours, to be covered in five weeks, from the eighth to the twelfth, inclusive; for Bombers, thirty-seven hours, to be covered in four weeks, from the fifth to the eighth, inclusive, and for Observers, forty-two hours, from the fifth to the ninth week, inclusive.

b. Staff: The work in the Gunnery Department has been carried out under three different Heads of Departments. The first Head of the Gunnery Department was Dr. Lloyd T. Jones, (later commissioned First Lieutenant A.S.S.C.). Dr. Jones was a member of the committee to Toronto and served as Head of the Gunnery Department from the beginning of the school until the time he was transferred to Washington in April 1918. A large number of mechanical devices used as aids in instruction were developed by Dr. Jones during his period of service here. When Dr. Jones was called away, Mr. Geo R. McDonald was appointed Head of the Department, serving for a short time only, when he left for work with the Shipping Board. Lieut. Walter Dreyer was then made Head of the Gunnery Department and has ably carried out the work started by Dr. Jones.

In choosing instructors for the Gunnery Department, much emphasis has been placed on mechanical ability, and in addition, many of the instructors were college graduates in engineering or scientific departments. During the early months of operation, this School attempted to obtain incapacitated Canadian officers to serve as Gunnery instructors and also attempted to get men from the Ordinance Department of the United States Army. These attempts failed, however, due to the scarcity of such material at that time.

The practice adopted by the University of selecting men for this department who had had mechanical experience and education has worked out extremely well. The

2. Gunnery Department:

a. General: The work of the Gunnery Department has in general covered instruction in the Lewis, Marlin and Vickers machine guns and has at various times included lectures on bombs and aerial tactics. The infantry type of gun was used for several months until the airplane type was available. The method of instruction in machine gun has been almost entirely by laboratory work, where the student handled the gun constantly in stripping and assembling work, this work in the laboratory being supplemented at times by stoppage firing and target firing on the 25 yard range. During the latter months of the school, the lectures on bombs and aerial tactics were omitted from the gunnery course. Trap Shooting has also been handled by the Gunnery Department during the entire time that Trap Shooting has been given, although for some months it was scheduled as a part of the Sports program.

The length of the courses of instruction in Gunnery has varied somewhat under the different curricula. Originally, in the curriculum of June 11, 1917, the plan was to have instruction in Gunnery extend throughout the entire course. In the eight week curriculum of November 1, 1917, instruction in Gunnery totaled fifty hours and extended throughout the entire eight weeks' course. In the twelve weeks' course, revised curriculum of April 1, 1918, instruction in Gunnery amounted to fifty-two hours, beginning in the third week and extending through the balance of the course. In the October 1918 revision of the twelve weeks' curriculum the Gunnery course for pilots amounted to sixty-two hours, to be covered in five weeks, from the eighth to the twelfth, inclusive; for bombers, thirty-seven hours, to be covered in four weeks, from the fifth to the eighth, inclusive, and for observers, forty-two hours, from the fifth to the ninth week, inclusive.

b. Staff: The work in the Gunnery Department has been carried out under three different Heads of Department. The first Head of the Gunnery Department was Dr. Floyd E. Jones, (later commissioned first lieutenant A.S.S.O.). Dr. Jones was a member of the committee to Toronto and served as Head of the Gunnery Department from the beginning of the school until the time he was transferred to Washington in April 1918. A large number of mechanical devices used as aids in instruction were developed by Dr. Jones during his period of service here. When Dr. Jones was called away, Lt. Leo E. Coleman was appointed Head of the Department, serving for a short time only, when he left for work with the Shipping Board. Lieut. Walter Dreyer was then made Head of the Gunnery Department and has ably carried out the work started by Dr. Jones.

In choosing instructors for the Gunnery Department, much emphasis has been placed on mechanical ability, and in addition, many of the instructors were college graduates in engineering or scientific departments. During the early months of operation, this school attempted to obtain inexperienced Canadian officers to serve as Gunnery instructors and also attempted to get men from the Ordinance Department of the United States Army. These efforts failed, however, due to the scarcity of such material at that time.

The practice adopted by the University of selecting men for this department who had had mechanical experience and education has worked out extremely well. The

majority of instructors, of course, had no knowledge of the machine gun before coming to the school, but these men were taken in hand by the Head of the Department, or older instructors, and were carefully taught the gun and the methods of instruction to be followed at this School. This scheme has helped to maintain uniformity of instruction, a problem which has been of some moment in the Gunnery Department because of the size of the staff. Some difficulty has been experienced at this school in using men as instructors who have had previous experience with the machine gun, because of the fact that such men usually have certain ideas of their own regarding methods of instruction, which did not always agree with the methods adopted here and it has some times been difficult to maintain uniformity of instruction with men of this type. This does not apply, of course, to all enlisted men who have been sent to this School as instructors from other Gunnery Schools.

During the early months it was found practical to use men on a weekly basis who were planning to go through the School as cadets. No men were used for this work, however, who had not had mechanical training, and in most cases the men were college graduates or college students of two or three years' standing. Probably ten or twelve men, all told, were employed on a weekly basis for temporary duty while waiting call to the School.

The School has been fortunate in obtaining several excellent enlisted instructors from Gunnery Schools. Also men have been used here with good results who have gone through Ground Schools and were later disqualified at the flying fields because of some physical defect there developed.

When instruction in the Marlin gun was started in March, 1918, two civilian instructors from this School were sent to take a short course in the Marlin gun at Ellington Field, Houston, Texas. This was very helpful inasmuch as these men gained an excellent knowledge of the gun and methods of teaching it and were able to instruct the other members of the staff who were to teach the Marlin gun.

The efficiency of the instructors has been materially raised by permitting them to fire on the range both the Marlin and Lewis guns. Each instructor has been permitted to fire each gun at specified hours, no cadets being present, and special attention was paid to stoppages and jams. Since firing of the Marlin gun was authorized, a marked improvement in the work of the instructors has been noticed.

The organization of the Gunnery staff was good, frequent departmental meetings being held at which times the various problems of instruction were freely discussed by members of the staff. The detail work of the department has been divided among the various instructors, certain men being made responsible for schedule, arrangement of work, examination questions, grading papers, etc. One of the enlisted instructors who had had much experience with machine guns was appointed armorer, this man being held responsible for proper condition of the guns and for all spare parts, tools, etc. needed in the Gunnery Department. It is believed that in schools of this sort it would be extremely desirable if the War Department found it convenient to assign an experienced gunnery man as armorer, his sole duty to be to keep the guns in proper condition and look after the spare parts of the guns.

majority of instructors, of course, had no knowledge of the service yet before coming to the school, but those men were taken in hand by the head of the department, or other instructors, and were carefully taught the ins and outs of instruction. This course has been followed at this Camp. Some difficulty has been experienced in the matter of instruction, a problem which was found of some moment in the Summer Department because of the size of the staff. Some difficulty has been experienced at this school in using men as instructors who have had previous experience with the machine gun, because of the fact that such men usually have certain ideas of their own regarding methods of instruction, which did not always agree with the methods adopted here and it has at times been difficult to maintain uniformity of instruction with men of this type. This does not apply, of course, to all officers who have been sent to this School as instructors from other Summer Schools.

During the early months it was found practical to use men on a weekly basis who were qualified to be stationed at Camp. Men were sent for this work, however, who had not had preliminary training, and in most cases the men were college graduates or college students of two or three years' standing. Probably ten or twelve men, all told, have employed on a weekly basis for instructing duty while answering call to the School.

The School has been fortunate in obtaining several officers qualified instructors from Camp Lewis Canada. Also men have been sent here with good records gone through Machine Gun Schools and were later discharged on the ground that some physical defect had developed.

When instruction in the Marlin gun was started in March, 1918, two civilian instructors from this School were sent to take a short course in the Marlin gun at Allington Field, Toronto, Ontario. This was very helpful because no there was practically no knowledge of the gun and methods of teaching it and were able to instruct the other members of the staff who were to teach the Marlin gun.

The efficiency of the instructors has been materially raised by permitting them to fire on the range both the Marlin and Lewis guns. Each instructor has been permitted to fire each day at specified hours, no cartridges being provided, and special ammunition was sent to Kingston for this. Since firing on the Marlin gun was authorized, a marked improvement in the work of the instructors has been noticed.

The organization of the Summer staff was good. Frequent departmental meetings being held at which time the various problems of instruction were freely discussed by members of the staff. The detail work of the department has been divided among the various instructors, certain men being responsible for schedule, arrangement of work, examination questions, grading papers, etc. One of the enlisted instructors who had had experience in the service from the beginning of the war, and having seen service in France, is responsible for the care and repairing of the guns and for all spare parts, tools, etc. Owing to the proper condition of the guns and for all spare parts, tools, etc. Owing to the Summer Department. It is believed that in schools of this sort it would be advisable to have the department head be responsible for the care of the guns. Nearly each instructor, and this seems to be a good idea, is given the care of certain guns, and it is his duty to be sure the guns in proper condition and look after the spare parts of the guns.

Instruction - Gunnery

The hours of instruction in the Gunnery Department have varied from time to time depending upon the size of the squadrons. An attempt has been made, however, to require from twenty-five to thirty five hours of instruction, including grading of papers, of each instructor.

A complete list of the instructors who have served in the Gunnery Department is given in Appendix Il . From this list of instructors it will be seen that a total of forty men have served as Gunnery instructors in this School. The maximum number on duty at any time was during the month of July, 1918, when twenty-three men were on the Gunnery staff. At the time when this maximum number of instructors was required, work in Gunnery extended over a period of eleven weeks, from C to M Squadrons inclusive, (Including Fx Squadron) and approximately eight hundred men received from four to six hours instruction in Gunnery during the maximum week in this department. With fifty-two hours instruction in Gunnery scheduled in the twelve weeks' curriculum and an instruction week of thirty-nine hours, there were necessarily many hours during the week when at least two squadrons were receiving instruction at the same time. With two squadrons of eighty-five each receiving instruction at the same time, and limiting the number of cadets per instructor to eight, a staff of twenty-one men would be required. On account of schedule difficulties, it was sometimes necessary to have as many as three large squadrons receiving Gunnery instruction at the same hour. In such cases, however, two squadrons would be doing laboratory work and the third squadron would receive a lecture which required only one instructor. Hence a staff of twenty-three men in the Gunnery Department was able to handle the instruction during the period of maximum size of the School.

From Appendix Il the following points regarding the staff of the Gunnery Department may be noted. Of the forty Gunnery instructors who taught at this School, twenty-seven served as civilians during the entire period of their service, twenty-five instructors were university graduates and five others had had from one to three years university training. Five instructors had taken courses at Gunnery Schools. The average length of service of instructors in the Gunnery Department was 6.6 months while the average of all instructors was 7.7 months. The explanation of this comparatively short period of service is in the fact that, as mentioned above, several men were used as instructors for temporary duty while awaiting call to the School.

c. Curriculum Requirements. In taking up the curriculum requirements, the curricula of the following dates only will be considered:

Curriculum of June 11, 1917.
Curriculum of November 1, 1917.
Curriculum of April 1, 1918.
Curriculum of October 14, 1918.

There were revisions on September 26, 1917 and March 1, 1918, but these revisions were followed so closely by the curricula noted above that requirements under them will not be considered separately. The table below, showing the total hours required in Gunnery in the curricula of the dates shown, will be helpful in discussing briefly the schedule of instruction in the Gunnery Department.

The hours of instruction in the Gunnery department have varied from time to time depending upon the size of the squadrons. In attempt has been made, however, to require from twenty-five to thirty-five hours of instruction, including grading of papers, of each instructor.

A complete list of the instructors who have served in the Gunnery Department is given in Appendix II. In this list of instructors it will be seen that a total of forty men have served as Gunnery instructors in this school. The maximum number on duty at any time was during the month of July, 1918, when twenty-three men were on the Gunnery staff. At the time when this maximum number of instructors was required, some in Gunnery extended over a period of eleven weeks, from 3 to 4 squadrons involved, (including 24 squadrons) and approximately eight hundred men received from four to six hours instruction in Gunnery during the maximum week in this department. With forty-two hours instruction in Gunnery scheduled in the twelve weeks' curriculum and an instruction week of twenty-nine hours, there were necessarily many hours during the week when at least two squadrons were receiving instruction at the same time. With two squadrons of eighty-five men receiving instruction at the same time, and limiting the number of marks per instructor to eight, a staff of twenty-one men would be required. On account of schedule difficulties, it was sometimes necessary to have as many as three large squadrons receiving Gunnery instruction at the same hour. In such cases, however, two squadrons would be doing laboratory work and the third a practice would receive a lecture which required only one instructor. Hence a staff of twenty-three men in the Gunnery Department was able to handle the instruction during the period of maximum size of the School.

From examination of the following points regarding the staff of the Gunnery Department may be noted. Of the forty Gunnery instructors who served at this School, twenty-seven served as civilians during the entire period of their service, twenty-five instructors were university graduates and five others had had from one to three years university training. Five instructors had taken courses at Gunnery Schools. The average length of service of instructors in the Gunnery Department was 6.5 months while the average of all instructors was 7.7 months. The explanation of this comparatively short period of service is in the fact that, as mentioned above, several men were used as instructors for temporary duty while awaiting call to the School.

c. Curriculum and Schedule. In taking up the curriculum requirements, the curricula of the following dates only will be considered:

Curriculum of June 11, 1917.
Curriculum of November 1, 1917.
Curriculum of April 1, 1918.
Curriculum of October 14, 1918.

There were revisions on September 24, 1917 and March 1, 1918, but these revisions were confined so closely to the curricula noted above that requirements under them will not be considered separately. The tabs below, showing the total hours required in Gunnery in the curricula of the dates shown, will be helpful in showing briefly the schedule of instruction in the Gunnery Department.

Instruction - Gunnery

Table No. 11.

	Total Hours Required in Curriculum of							
	6/11/17	9/26/17	11/1/17	3/1/18	4/1/18	10/14/18		
						Pilots	Bomb	Obser
Gunnery								
Machine Guns (Elem.)	15							
Fighting in Air	1							
Machine Guns (Adv.)	14							
Bombs & Bombing	4							
Gunnery								
Practical		32	40					
Aerial Tactics		3	3					
Bombs & Bombing		4	4					
Examinations		3	3					
Gunnery								
Practical				50	50			
Examinations				2	2			
Gunnery								
Machine Guns						50	30	30
Traps						10	5	10
Examination						2	2	2

The curriculum of June 11, 1917, provided for twenty-nine hours instruction in machine guns, fifteen of which were to be given in the Junior Wing, one hour lecture on Fighting in the Air and four hours on Bombs and Bombing. This course was followed as laid out except that for the first few weeks it was not possible to give instruction in the Junior Wing because of the fact that only one machine gun was available for instruction purposes. In this curriculum the work in Gunnery extended throughout the entire eight weeks, although no division of time by weeks was made in the curriculum.

The curriculum revised in stencil No. 37, under date of November 1, 1917, provided for forty hours practical Gunnery, three hours lectures on Aerial Tactics, four hours lectures on Bombs and Bombing and three hours examination. Stencil No. 37, included in this report as Appendix F4 states briefly the work to be given in the Gunnery Department under this curriculum. In addition to the study of various types of machine guns, knowledge of nomenclature, ability in stripping, sighting practice and machine gun firing on a 25 yard range were required. The curriculum of November 1, 1917, provided for instruction in Gunnery throughout the entire eight weeks, each week having five hours practical work in Gunnery to be given at least one half hour daily.

Table No. 11.

Total Hours Required in Curriculum of

	4/11/17	9/10/17	11/1/17	3/1/18	4/1/18	10/14/18	
						Bombs	Observ.
Gunnery							
Machine Guns (Lec.)		15					
Firing in air		1					
Machine Guns (Lab.)		15					
Bombs & Bombing							
Gunnery							
Practical				40			
Aerial Target				5			
Bombs & Bombing				4			
Examinations				3			
Gunnery							
Practical			50		50		
Examinations					2		
Gunnery							
Machine Guns			30		30	30	
Traps			10		5	10	
Examination			2		2	1	

The curriculum of June 11, 1917, provided for twenty-nine hours instruction in machine guns, fifteen of which were to be given in the Junior Wing, one hour lecture on fighting in the air and four hours on Bombs and Bombing. This course was followed as laid out except that for the first few weeks it was not possible to give instruction in the Junior Wing because of the fact that only one machine gun was available for instruction purposes. In this curriculum the work in Gunnery extended throughout the entire eight weeks, although no division of time by weeks was made in the curriculum.

The curriculum revised in August 20, 27, under date of November 1, 1917, provided for forty hours practical Gunnery, three hours lectures on Aerial Targets, four hours lectures on Bombs and Bombing and three hours examination. Appendix No. 37, included in this report as Appendix 7 states briefly the work to be given in the Gunnery Department under this curriculum. In addition to the study of various types of machine guns, knowledge of mechanisms, skill in aiming, sighting practice and machine gun firing on a 30 yard range were required. The curriculum of November 1, 1917, provided for instruction in Gunnery throughout the entire eight weeks, each week having five hours practical work in Gunnery to be given at least one half hour daily.

Instruction - Gunnery.

In the twelve weeks' curriculum, revised April 1, 1918, (Stencil No. 157), the work in Gunnery consisted of fifty hours practical work on the gun and two hours examination, the lectures on Aerial Tactics and Bombs having been eliminated. Instruction in Gunnery under stencil No. 157, began in the third week of the curriculum, continuing for the balance of the course, covering a period of eleven weeks (including Fx squadron) and averaging about five hours per week. Page 8 of stencil No. 157, revised in O. S. 21 allots the hours of instruction to be devoted to the Lewis Gun, Marlin Gun and Sighting, as shown below.

AERIAL GUNNERY

GROUND SCHOOL GUNNERY TRAINING

Subjects of Instruction

1. Lewis Gun 2. Marlin 3. Ring Sights

Subjects of instruction in these guns will be as follows:

1. Lewis Gun	Time Allotted	
(a) General description and nomenclature	3 Hours	
(b) Mechanism (notes to be given in full from stencil	4 "	
(c) Stripping	3 "	
(d) Drill	3 "	
(e) Stoppages and immediate action (Indoor Work)	4 "	
(f) Care and Cleaning (Notes to be given in full (from stencil)	3 "	
(g) Points before and after firing on range	2 "	
(h) Testing magazines, ammunition, etc.	2 "	24 Hours
2. Marlin Gun		
(a) General Description	3 "	
(b) Mechanism (Notes to be given in full from Stencil)	4 "	
(c) Stripping	3 "	
(d) Drill (Loading and unloading)	2 "	
(e) Stoppages and immediate action	4 "	
(f) Care and cleaning	3 "	
(g) Points before and after firing on range	2 "	21 "
3. Ring Sights, Norman Vane Foresight and Aiming		3 "
4. Examination two hours on each gun		4 "
		52 Hours

No range work will be carried out at Ground Schools.

In the twelve weeks' curriculum, revised April 1, 1918, (General No. 147), the work in Gunnery consisting of Fifty hours, practical work on the gun and two hours examination, has features on actual firing and have been eliminated. Instruction in Gunnery under General No. 147, comes at the half week on the curriculum, running for the balance of the course, covering a period of eleven weeks (including 24 inspection) and averaging about five hours per week. Page 7 of General No. 147, revised in O. S. 21 allots the hours of instruction to be devoted to the Lewis Gun, Marlin Gun and Sighting, as shown below.

Gunnery

Period of Instruction

Subjects of Instruction

1. Lewis Gun 2. Marlin 3. Ring Sights

Subjects of instruction in these guns will be as follows:

1. Lewis Gun	Time Allotted
(a) General description and nomenclature	3 Hours
(b) Mechanism (Notes to be given in full from stencil)	4 "
(c) Stripping	3 "
(d) Drill	4 "
(e) Stoppages and immediate action (Lecture work)	4 "
(f) Care and Cleaning (Notes to be given in full (from stencil)	3 "
(g) Points before and after firing on range	2 "
(h) Testing magazines, ammunition, etc.	2 " 24 Hours

2. Marlin Gun	
(a) General description	3 "
(b) Mechanism (Notes to be given in full from stencil)	4 "
(c) Stripping	3 "
(d) Drill (Loading and unloading)	2 "
(e) Stoppages and immediate action	4 "
(f) Care and cleaning	3 "
(g) Points before and after firing on range	2 " 21 "

3. Ring Sights, Norman Vane Foresight and Aiming	3 "
4. Examination two hours on each gun	4 "

Lectures will be delivered at the Central Gunnery.

Instruction - Gunnery

Instruction in the C. C. Gear began on September 23, 1918 in accordance with directions received in Bulletin No. 321, the time for this work (3 hours) being deducted from the Marlin Gun instruction as directed in Bulletin No. 321.

Stencil No. 272, Revised Curriculum of October 14, 1918, made very little change in the work of the Gunnery Department except that the number of hours was decreased for Bombers and Observers, these candidates not being required to study the Marlin Gun. Also stencil No. 272 transferred the work in Trap Shooting to the Gunnery Department. The course in Gunnery outlined in this stencil covered five weeks for Pilots, from the eighth to twelfth, inclusive; Bombers four weeks, from the fifth to eighth, inclusive, and Observers five weeks, from the fifth to the ninth, inclusive. It will be noted that the work in Gunnery did not run throughout the entire course, but was to be given in the last weeks of the course in each School. The outline on the following sheet shows the allotment of hours to be devoted to the work in Gunnery as given in Stencil No. 272.

[illegible] began on September 23, 1919 in accordance with directions received in Bulletin No. 321, the time for this work (3 hours) being deducted from the [illegible] in Gun Instruction as directed in Bulletin No. 321.

Stencil No. 272, Revised Curriculum of October 14, 1919, made very [illegible] in this stencil covered five weeks for pilots, from the eighth to twelfth, [illegible] the work in summary. [illegible] to be given in the last weeks of the course in each School. The outline on the following sheet shows the allotment of hours to be devoted to the work in Gunnery as given in Stencil No. 272.

SYLLABUS FOR COURSE IN GUNNERY
in

UNITED STATES SCHOOLS OF MILITARY AERONAUTICS
Revised October 14, 1918.
(From Stencil 272.)

	Hours alloted for		
	Pilots	Bombers	Observers
1. Lewis Gun			
(a) General Description and nomenclature	3	3	3
(b) Mechanism (Notes to be given in full from Stencil)	6	6	6
(c) Stripping	4	4	4
(d) Drill	1	2	2
(e) Stoppages and immediate action(Indoor Work)	2	3	3
(f) Care and Cleaning (Notes to be given in full from Stencil)	2	3	3
(g) Points before and after firing on range	1	2	2
(h) Testing magazines, ammunition, etc.	1	2	2
	20	25	25
2. Marlin Gun			
(a) General Description	3	-	-
(b) Mechanism (Notes to be given in full from stencil)	6	-	-
(c) Stripping	5	-	-
(d) Drill (Loading and unloading)	2	-	-
(e) Stoppages and immediate action	2	-	-
(f) Care and cleaning	3	-	-
(g) Points before and after firing on range	2	-	-
	23	-	-
3. Ring Sights. Norman Vane Foresight and Aiming (Under Ring Sights may be included the necessary instruction in the application of the Ring Sight to Trap Shooting)	5	5	5
4. Traps with Ring Sights (Not to exceed 25 rounds per period)	10	5	10
5. C. C. Gear (Nomenclature and Mechanism only)	2	-	-
Examination	2	2	2
	62	37	42

No range work will be carried out at Ground Schools

	Corps of Cadets for		
	Illinois	Southern Methodist	Texas
1. Leadership			
(a) General description and recommendations	2	2	2
(b) Area in which cadets to be given in full from (Good, Average)	3	6	3
(c) Intelligence	4	4	4
(d) Will	2	2	2
(e) Judgment and knowledge with (Above Average)	3	3	3
(f) Ease in directing cadets in group			
(g) Ability to deal with (Good, Average)	4	4	4
(h) Ability to deal with (Good, Average)	2	2	2
(i) Testing requirements, demonstration, etc.	1	1	1
	20	22	20
2. Rifle Drill			
(a) General description	1	-	-
(b) Area in which cadets to be given in full from (Good, Average)	3	-	-
(c) Intelligence	4	-	-
(d) Will (Leading and motivating)	2	-	-
(e) Judgment and knowledge of drills	2	-	-
(f) Ease and directing	2	-	-
(g) Drills before and after firing on range	-	-	-
	14	-	-
3. Pistol Drill (Same Item Averages and Group			
(Other Drill Points may be included the mechanical instruction in the application of the Drill Field as Drill Manual)	3	-	-
4. Drill with the Pistol			
(Not to exceed 12 points per period)	12	-	12
5. G. O. 100 (Commissions and Leaves on duty)	1	-	-
Description	2	-	-
	52	22	32

[illegible] range work will be carried out in [illegible]

Instruction-Gunnery.

As the curriculum of October 14, 1918 went into effect shortly before the signing of the armistice, the work in Gunnery was never carried out exactly as laid out in the curriculum. Telegram from Washington dated November 18, 1918, directed that Pilots be taught the Marlin Gun only, and letter under date of November 25, 1918 directed that the course for Pilots under the curriculum of October 14, 1918 be shortened from twelve to ten weeks, the first nine weeks to be as outlined in Stencil 272, and a special curriculum for the tenth week being provided in the above mentioned letter. The effect of these changes on the course in Gunnery for Pilots was to shorten the course from five to three weeks, eliminating instruction on the Lewis Gun. The time allowed for Gunnery after these changes was as follows:

Gunnery	Squadron H	Squadron I	Squadron K	Total
Machine Guns	10	$7\frac{1}{2}$	$12\frac{1}{2}$	30
Traps		$2\frac{1}{2}$	$2\frac{1}{2}$	5
Examination			2	2
Total				37

This time was utilized as shown below and squadrons graduating under the Revised Curriculum of October 14, 1918, received instruction in Gunnery as follows:

Marlin Gun, as outlined in Stencil 272	23 hours
Ring Sights " " " " "	5 "
C. C. Gear " " " " "	2 "
Traps	5 "
Examination	2 "
	37 "

Observers and Bombers were to still receive instruction in the Lewis Gun but this School graduated no Bombers and only one small squadron of Observers under the curriculum of October 14, 1918 so the effect of shortening the course was practically to eliminate instruction on the Lewis Gun.

d. Laboratory Space: The work in Gunnery, with the exception of a few lectures, has always been given in the Aeronautics Laboratory Building. When the first unit of this building was completed in June, 1917, two rooms, 15' x 30', were assigned to the Gunnery Department, these rooms being equipped with tables for mounting the guns for instructional purposes. For several weeks, only one machine gun was available and it was necessary to split the squadrons into sections in order that each man might have an opportunity to handle the gun.

This time was utilized as shown below and squadrons graduating under the revised Curriculum of October 14, 1918, received instruction in Cookery as follows:

Baking Sec. 4A cadets in Course1 [illegible]	25 hours
Lang Course " " " " "	5 "
C. O. dept " " " " "	2 "
[illegible]	5 "
[illegible]	2 "
Mess officers	27 "

Instruction-Gunnery.

In October, 1917, a room was constructed in the attic of the Aeronautics building providing a space about 25' x 40', which was used by the Gunnery Department for machine gun instruction and for sighting practice, and was also used by the Signalling Department.

When building No. 2 was completed in November, 1917, the Gunnery Department was assigned Rooms 3 and 6, Room No. 3 being 32' x 40' and large enough to accommodate eighty men, Room No. 6 being 20' x 40', large enough to hold eight tables and 64 men.

Also about the time of the completion of building No. 2 the rooms originally used by the Gunnery Department in building No. 1 were required for staff use and the Gunnery Department was given Room No. 14, 22' x 27', holding eight tables and 64 men, this room being no longer required by the Observation Department, as a new Miniature Range had been constructed in Room 11. Room 14 was later turned over to the Engines Department in exchange for room No. 1 in building No. 2. About this time room No. 6, (renumbered No. 4) was enlarged to 30' x 40' which gave it sufficient capacity to handle approximately 100 men.

In April, 1918, the Gunnery Department had available the following laboratory space:

Room No. 1,	30' x 42',	capacity	10 tables,	80 men.
" " 3,	30' x 42',	"	10 "	,80 "
" " 4,	30' x 40',	"	12 "	, 96 "

At this time the Gunnery Department was operating on the twelve weeks' curriculum and during the following months when the large squadrons were going through the school instruction in Gunnery was being given to 11 squadrons, (including FX squadron) averaging about 73 men each, or a total of about 800 men. With the three above mentioned rooms available as Gunnery Laboratories it was possible to give instruction to three large squadrons at the same hour, the limiting feature being the number of instructors and not laboratory space. Additional space was obtained during the summer months of 1918 by giving Gunnery instruction out of doors within the enclosure surrounding the Laboratory Building. From twenty to twenty-four tables with necessary benches for seats were placed in the open for this work, and a large part of the instruction heretofore given in Rooms 1 and 3 was given outside. The ventilation in these two rooms was such that more efficient work could be done out of doors when large squadrons were receiving instruction for long periods. The outdoor work was very satisfactory, being fully as quiet and isolated as the work inside the building. The conditions under which this work was given out of doors are shown in the picture on page 137.

In October, 1917, a year was questioned in the style of the aeronautics building providing a room about 60' x 40', which was used by the Gunnery Department for theoretical instruction and for sighting practice, and was also used by the Signalling Department.

Upon building No. 2 was completed in November, 1917, the Gunnery Department was assigned rooms 2 and 3, room No. 2 being 80' x 40' and large enough for a gunnery class, room No. 3 being 30' x 40', large enough to hold eight tables and 80 men.

Also about the time of the completion of building No. 2 the rooms originally used by the Gunnery Department in building No. 1 were returned the night use and the Gunnery Department was given Room No. 14, 40' x 47', building eight tables and 64 men, this room being no longer required by the Construction Department, as a new drafting room had been constructed in Room 11. Room 14 was later vacated over to the Engineer Department in exchange for room No. 1 in building No. 2. Gunnery table then No. 6, introduced in 4) was enlarged to 40' x 40' which gave it sufficient capacity to handle approximately 100 men.

In April, 1918, the Gunnery Department had available the following laboratory space:

Room No. 1,	30' x 42',	capacity	10 tables,	80 men.
" " 3,	30' x 42',	"	10 "	80 "
" " 4,	30' x 40',	"	12 "	96 "

At this time the Gunnery Department was operating on the twelve weeks' course and during the following months when the squadrons were going through the school instruction in Gunnery was being given to 11 squadrons, (including 11 squadrons, averaging about 70 men each, or a total of about 800 men. With the same number of tables and equipment as Gunnery Laboratories of the previous year, this instruction is being given in the same hour, the limiting feature being the number of instructors and not laboratory space. Additional space was obtained during the summer months of 1918 by giving Gunnery instruction out of doors within the enclosure surrounding the laboratory building. From twenty to twenty-four tables with accompanying benches for seats were placed in the open for fair weather, and a large part of the instruction heretofore given in Rooms 1 and 3 was given outside. The ventilation in these two rooms was such that more efficient work could be done in the open. Some of the instruction was given in the open, which this work was given out of doors are shown in the picture on page 137.

Plate No. 12 - "Outdoor Gunnery Laboratory".

Instruction-Gunnery.

The picture on page 139 shows the interior of Room 3 used as an instruction laboratory for the Lewis Gun. The arrangement of tables and benches, and method of mounting the gun on the table for instruction purposes are well shown in this picture. All cadets remain seated except the one actually handling the gun, thereby maintaining order and permitting all to watch the work being done on the gun. The picture target, shown in the rear of the room, used for sighting practice, will be discussed later in connection with a close-up view of one of these targets. The picture on page 140 shows the interior of Room 4 used as a laboratory for instruction on the Marlin Gun.

In June, 1918, one corner of Room 1 was partitioned off and used as a Gunnery store room. In this room a work bench was provided for the Armorer and cases for spare parts were also provided. This room was kept locked and the Armorer was the only one of the instructors having permission to enter the room and give out spare parts. This plan has been very helpful in keeping track of the smaller parts of the Gunnery equipment. On page 141 is a picture of the Gunnery Storeroom during the process of construction.

e. Laboratory Equipment: Under this head will be taken up briefly the guns available for instruction at the school and the method of storing them, certain special equipment constructed by the School being described and illustrated in a later paragraph.

When the School opened, instruction in theGunnery Department was begun with one 22 caliber automatic rifle. In the third week of instruction one Lewis machine gun was received and this was the only gun available until August, 1917. The early part of August, 1917, three additional Lewis guns were received andshortly thereafter four more Lewis guns were shipped to this School. About the same time twenty rounds of British dummy cartridges were received for instructional purposes. In November, 1917, ten more Lewis guns were received by this School making a total of eighteen then available for instruction purposes.

Up to this time all guns had been equipped with the infantry tripod and the ordinary butt stock, no airplane mounts or deflector bags having been received with any of the guns. Repeated requests were made for this equipment but it was evidently impossible to obtain it earlier and on December 4th the school was advised that thirteen mounting yokes and standards and ten deflector bags had been requisitioned. These articles came through in due time thereafter. The method of storing the Lewis guns and the type of case used is shown in the picture on page 142 . These cases were constructed according to planssubmitted by the Gunnery Department.

The picture on page 139 shows the interior of Room 3 used as an instruction laboratory for the Lewis Gun. The arrangement of tables and benches, and method of mounting the gun on the table for instruction purposes are well shown in this picture. All cadets remain seated except the one actually handling the gun, thereby maintaining order and permitting all to watch the work being done on the gun. The picture target, shown in the rear of the room, used for sighting practice, will be discussed later in connection with a close-up view of one of these targets. The picture on page 140 shows the interior of room 4 used as a laboratory for instruction on the Merlin Gun.

In June, 1918, one corner of Room 1 was partitioned off and used as a Gunnery store room. In this room a work bench was provided for the armorer and cases for spare parts were also provided. This room was kept locked and the armorer was the only one of the instructors having privileges to enter the room and give out spare parts. This plan has been very helpful in keeping track of the smaller parts of the Gunnery equipment. On page 141 is a picture of the Gunnery Storeroom during the process of construction.

e. Laboratory Equipment: Under this head will be taken up briefly the guns available for instruction at the school and the method of storing them, certain special equipment constructed by the School being described and illustrated in a later paragraph.

When the School opened, instruction in Gunnery Department was begun with one 22 caliber automatic rifle. In the third week of instruction one Lewis machine gun was received and this was the only gun available until August, 1917. The early part of August, 1917, three additional Lewis guns were received and shortly thereafter four more Lewis guns were shipped to this School. About the same time twenty rounds of British dummy cartridges were received for instructional purposes. In November, 1917, ten more Lewis guns were received by this School making a total of eighteen then available for instruction purposes.

Up to this time all guns had been equipped with the infantry sights and the ordinary butt stock, no airplane mounts or deflector bags having been received with any of the guns. Repeated requests were made for this equipment but it was evidently impossible to obtain it earlier and on December 4th the School was advised that thirteen mounting plates and standards and ten deflector bags had been requisitioned. These articles were drawn in due time thereafter. The method of storing the Lewis guns and the type of case used is shown in the picture on page 142. These cases were constructed according to plans submitted by the Gunnery Department.

Plate No. 13 - Lewis Machine Gun Laboratory - Room 3.

Plate No. 14 - Marlin Machine Gun Laboratory - Room 4.


WINCHESTER
WINCHESTER
WINCHESTER

Plate No. 15 - Gunnery Tool Room

Plate No. 16 - Method of storing Lewis Machine Guns.

Instruction-Gunnery.

In the early part of December, 1917, five Vickers guns were received and instruction on this gun was started. On December 22nd, however, orders were received to discontinue the Vickers gun and the guns on hand were ordered shipped to Ellington Field.

When instruction on the Marlin gun was instituted in the twelve weeks' curriculum in March, 1918, 18 Marlin aircraft guns with space parts and accessories were received for this work. This number has proved ample to provide instruction for the size of squadrons which have been sent to the school. The picture on page144shows the cases and method of storing the Marlin guns, and the picture on page145 shows the Marlin gun mounted on a table ready for loading drill.

Cleaning rods, dummy cartridges, oil cans, etc. were all placed in one case and could be removed and replaced in an efficient manner when required for the work of any one hour. The method of keeping a complete set of cleaning implements with each gun was tried but was not satisfactory at this School.

For the instruction in Trap Shooting, the School, was furnished by the War Department four Ideal Leggett Traps and 22 Winchester Pump Guns, Model 1897. The subject of Trap Shooting will be discussed in detail later.

f. Special Equipment. During the development of the work in Gunnery numerous pieces of special equipment were devised and special structures erected for assisting in the work of instruction and in order to comply with directions from Washington regarding the methods of instruction. Several of these devices it is believed originated at this School, being the work of Dr. Jones while serving here as head of the Gunnery Department. Some of the items mentioned below will be referred to again in more detail under the paragraph "Instruction".

The magazines for the Lewis gun sent to this School were of the infantry type intended for handling with both hands. In order to give the cadets proper instruction and practice in handling the magazine with one hand, the strap handle illustrated on page146 was made, using as a sample a picture of a similar arrangement used by the British.

As an aid in instruction in stoppages, stoppage firing was instituted in the early weeks of the course. An emplacement for mounting the gun was constructed as follows. Four 4" pipes, each about 20' long and spaced 6' apart, were placed with one end of each pipe resting on a firing table about 3' high, the other ends projecting into a convenient bank of earth. The ends of the

In the early part of December, 1917, five Vickers guns were received and instruction on this gun was started. On December 23rd, however, orders were received to discontinue the Vickers gun and the guns on hand were ordered shipped to Aberdeen Field.

Gun instruction on the Marlin gun was instituted in the twelve weeks' curriculum in March, 1918. 18 Marlin aircraft guns with spare parts and accessories were received for this work. This number has proved ample to provide instruction for the sign of aircraft which have been sent to the school. The picture on page 145 shows the Marlin gun mounted on a Lewis gun, and the picture on page 145 shows the Marlin gun mounted on a table ready for loading drill.

Mounting pins, sway barrages, oil cans, etc. were all placed in one case and could be carried and supplied in an efficient manner when required for the work of any one gun. The method of keeping a complete set of cleaning implements with each gun was tried but was not satisfactory at this school.

For the instruction in Trap Shooting, the School, was furnished by the War Department four sets of Hopper traps and 50 Winchester Trap Guns, model 1897. The subject of Trap Shooting will be discussed in detail later.

2. Special Devices. During the development of the work in numerous devices of mechanical equipment were devised and special structures erected for assisting in the work of instruction and in order to comply with directions from Headquarters regarding the methods of instruction. Several of these devices it is believed originated at this School, being the work of Dr. Jones, Lieutenant Lewis and Lieutenant Lockwood of the Ordnance Department. Some of the items mentioned below will be referred to again in more detail under the paragraph "Instruction".

The magazines for the Lewis gun sent to this School were of the infantry type intended for handling with both hands. In order to give the cadets proper instruction and practice in handling the magazine with one hand, the strap handle illustrated on page146 was made, using as a sample a picture of a similar arrangement used by the British.

As an aid in instruction in stoppages, stoppage firing was instituted in the early weeks of the course. An emplacement for mounting the gun was constructed as follows. Four 4" pipes, each about 30' long and spaced 6' apart, were placed with one end of each pipe resting on a firing table about 3' high, the other ends projecting into a convenient bank of earth. The ends of the

Plate No. 17 - Method of storing Marlin Machine Guns.

Plate No.18 - Loading drill device for Marlin Machine Gun.

Plate No. 19 - Handle for Lewis Machine Gun Magazine.

pipes projecting into the bank of earth were enclosed in a wooden box to prevent loose dirt closing the ends of the pipe. The gun was mounted on an airplane mount and placed on the table with about 3" of the radiator entering the pipe. The gun pointed straight down the pipe and there was no chance for a bullet going astray. This method of illustrating stoppage firing proved very satisfactory and was of great assistance in instruction in this branch of the work. The photograph on page148 shows the emplacements and arrangements of pipes used for this work. Upon orders from Washington stoppage firing was discontinued in the early months of 1918. Repeated requests were made for permission to take up this work again but without result.

Firing on the range required in the early curriculum necessitated the construction of a safe range which could be used for this work. The site chosen for this range was at the foot of the hills back of the campus. The pictures on pages149,150 and 151 , show the firing platform, the method of chaining the guns so they could not be trained off the target backing and the bulk head on which the targets were mounted. Firing on this range by cadets was ordered discontinued by Washington shortly after the range was completed.

Special dummy wooden guns, illustrated on page 152 , and discussed later under the subject of sighting were constructed according to plans of the Gunnery Department.

The picture target shown on page 153 , and explained in detail under Sighting was also devised under the direction of Dr. Jones while at this School.

The adaptation of the ring sight for use on shot guns in trap shooting it is believed originated at this School. This sight is illustrated on page 154 , and is described under Trap Shooting.

pipe in position with the bank of earth were enclosed in a wooden box to prevent dirt falling into the ends of the pipe. The gun was mounted on an elevated table and placed on the table with about 3" of the radiator [illegible] the pipe. The gun pointed straight down the pipe and there was no danger for a bullet going astray. This method of illustrating stoppage firing proved very satisfactory and was of great assistance in instruction in that branch of [illegible]. The photograph on page148 shows the emplacement and arrangements of [illegible] used for this [illegible]. Upon orders from Washington stoppage firing was discontinued in the early months of 1918. Repeated requests were made for permission to take up this work again but without result.

Firing on the range required in the early curriculum necessitated the construction of a safe range which could be used for this work. The site chosen for this range was at the foot of the hills back of the campus. The pictures on pages149,150 and 151 , show the firing platform, the method of chaining the guns so they could not be trained off the target backing and the bulk head on which the targets were mounted. Firing on this range by cadets was ordered discontinued by Washington shortly after the range was completed.

Special dummy wooden guns, illustrated on page 152 , and discussed later under the subject of sighting were constructed according to plans of [illegible].

The picture target shown on page 153 , and explained in detail under sighting was also devised under the direction of Lt. Jones while at this school.

The adaptation of the ring sight for use on shot guns in trap shooting it is believed originated at this School. This sight is illustrated on page 154 , and is described under trap shooting.

Plate No. 20 - Stoppage Firing Platform.

Plate No. 21 - Firing Platform at Machine Gun Range.

Plate No. 22 - Method of chaining machine gun at range to prevent it from being trained off bulkhead.

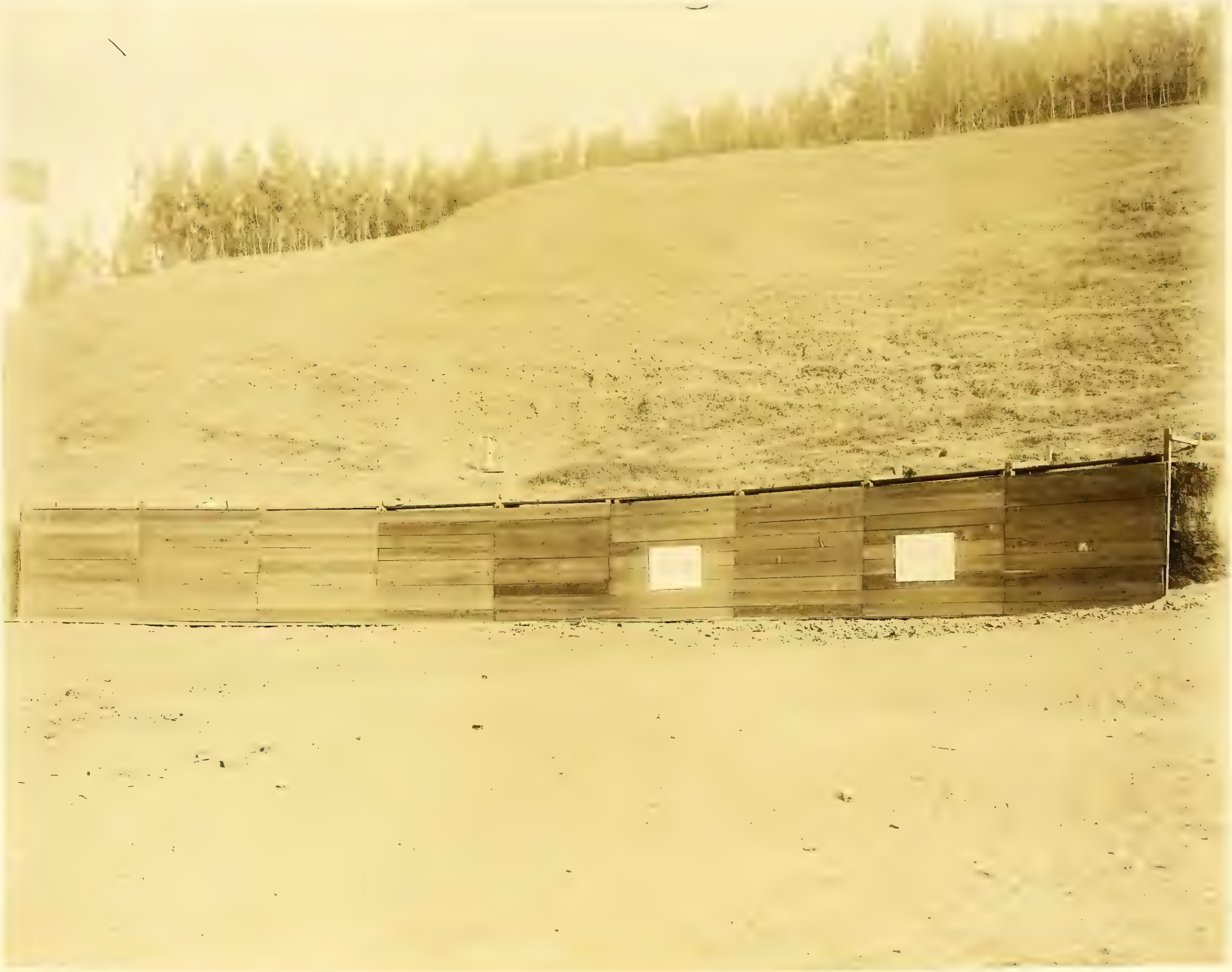
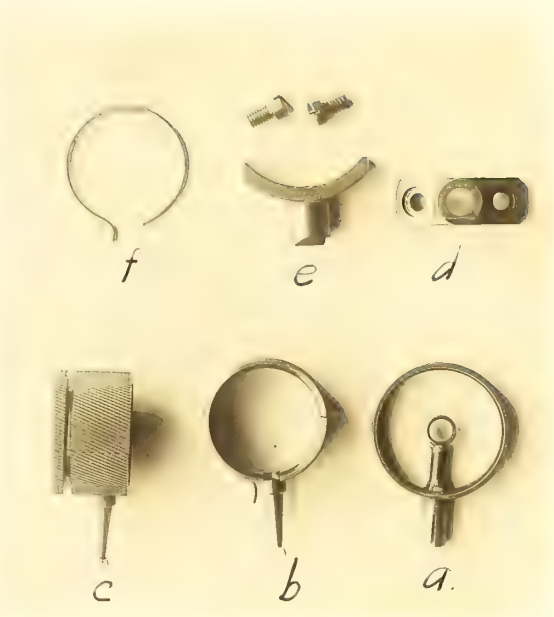


Plate No. 23 - Bulkhead backing for targets at Machine Gun Range.

Plate No.24 - Dummy gun for sighting practice.

Plate No. 25 - Picture target for sighting practice.



1.

3.

2.

Plate No. 26 - Ring Sight adapted for use on shot gun.

Instruction-Gunnery.

8. Instruction-General. During the first two weeks of the school, as noted above, instruction in machine guns was given by means of a .22 caliber Winchester automatic rifle. As equipment was received and the number of guns available increased from time to time, the course in Gunnery greatly improved. For several weeks, however, at the beginning of the school one Lewis gun only was available for instruction, in fact, this condition existed until August, 1917. The early curriculum called for instruction on machine guns in the Junior Wing, but on account of the fact that only one gun was available for a number of weeks the hours for instruction in the Junior Wing were largely used for Signalling or by some other course as it seemed desirable to allow the cadets in the senior wing to have the use of the one gun for as much time as was possible.

The curriculum has always specified the subjects to be taught and has, in the later copies of the curriculum, specified the hours to be devoted to each subject. Instructional material has been obtained from stencils furnished by the War Department and from pamphlets on the Lewis and Marlin guns issued by manufacturers.

Uniformity of instruction was for sometime a rather difficult problem in the Gunnery Department on account of the changes in the material taught and on account of the size of the Gunnery staff. Excellent results were obtained however by the following provisions:-

(1) The instruction given during each hour was definitely outlined, each instructor was furnished with a copy of this outline and was required to adhere strictly to the same.

(2) Some of the more experienced instructors were placed in charge of, and held responsible for, certain branches of the work. When the squadrons were large these men did not instruct cadets during the hours when they were in charge, but supervised the work of the other instructors, noting and correcting any deviation from the work as outlined. As the instructors became more experienced, and more familiar with the outline, this supervision ceased.

(3) The Inspector of Instruction, mentioned earlier in the report, whose duty was to watch the character of instruction, made observations of the instruction and suggested methods of improvement.

2. Instruction-Supervision. During the first two years of the school, we noted every instructor in machine practice given by means of a 35 caliber dismantler-assembler rifle. As equipment was received and the number of guns available increased from time to time, the course in machine practice became gradually lengthened. For several weeks, however, at the beginning of the school the school gun only was available for instruction, in fact, this condition existed until about, 1917. The early instructors being the instructors on another gun in the junior class, and on account of the fact that only one gun was available for a number of weeks the hours for instruction in the junior class were largely used for dismantling or by some other course as it seemed desirable to allow the students in the senior class to have the use of the gun for as much time as was possible.

The curriculum has always specified the subjects to be taught and but, in the later copies of the curriculum, specified the hours to be devoted to each subject. Instructional material has been obtained from circulars furnished by the Ordnance Department and from pamphlets on the Lewis and Marlin guns issued by manufacturers.

Inasmuch as instruction was for somewhat a longer duration, problems in the Gunnery department on account of the changes in the material became not an account of the size of the Gunnery staff. Instructor problems were obtained somewhat by the following procedure:-

(1) The instruction given during week-end and evening sessions each instructor was instructed also a copy of this material and was required to memorize already in his own.

(2) Some of the more experienced instructors were placed in charge of, and held responsible for, certain courses or the work. Some instructors were large from the not instructed should assist the course when they were in charge, and supervised the work of the newer instructors, noting and correcting mistakes from the work as noticed. As the instructors became more experienced, and more familiar with the outline, this supervision ceased.

(3) The Inspector of Instruction, mentioned earlier in the report, whose duty was to watch the character of instruction, made observations of the instruction and suggested methods of improvement.

Instruction-Gunnery.

The number of men per table was limited to eight, but the attempt was made to keep about six men per instructor wherever possible, one instructor being in charge of each table. For work on stripping this number was reduced to two or three men per gun which allowed more opportunity to handle the gun. When this was done, however, one instructor was responsible for two guns. The attempt was also made to have the cadets under the same instructor as much as possible although this could not always be carried out.

h. Instruction-Lewis Gun: For many months after opening the School the Lewis gun was the only gun used for laboratory instruction although other types were discussed in class, and instruction on this gun has always been given until the last few weeks of operation of the School. Instruction work on the Lewis gun has naturally improved from month to month and has been added to as new material was received from the War Department. The work, therefore, as given during the latter part of the course will be outlined as this is the best presentation so far developed in this School.

The revision of the curriculum in October 1918 provided for instruction on the Lewis gun. However, due to the signing of the armistice, instruction on this gun was discontinued for all classes except Observers. The course as outlined in the last curriculum followed practically the course given in the earlier twelve weeks' curriculum, hence the outline of instruction presented below will be based on the curriculum of April 1, 1918.

Instruction on the Lewis gun followed directions of O.S. 21 as regards the number of hours to be given to each subject.

The work in C Squadron consisted of three hours of general description, and one hour of mechanism. The work under general description was chiefly drill in nomenclature and functions of main parts, and drill in the study of the working parts of the receiver group, although the barrel group was shown by removing the radiator casing.

The first hour in D week was given to a review of mechanism and a 30 minute quiz on the work covered in C week. The second and third hours were given to slow change of parts and magazine drill (using strap handle magazine). The fourth hour in the week was given to a review of the mechanism of the receiver group, and the gun was completely stripped and each part explained in detail as the gun was assembled.

In E week, the first hour was given to testing of magazines and ammunition and a 30 minute quiz. The second hour was given to "Points

[illegible] was done, however, one instructor [illegible] attempt was also made to have the [illegible] as much as possible although this could [illegible].

[illegible] Instruction-Lewis Gun: For many months after opening the [illegible] the Lewis gun was the only gun used for laboratory instruction [illegible] types were discussed in class, and instruction on this [illegible] been given until the last few weeks of operation of the [illegible]. [illegible] on work on the Lewis gun has naturally improved from month to month and has been added to as new material was received from the War Department. The work, therefore, as given during the latter part of the course will be outlined as this is the best presentation so far developed in this school.

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Instruction on the Lewis gun followed directions of O.O. 31 as [illegible].

[illegible] in 6 squadron consisted of three hours of general [illegible]. The work under general de- [illegible] the working parts of the receiver [illegible] group was shown by removing the radiator casing.

[illegible] strap handle magazine). The fourth hour in the week was given to a re- view of the mechanism of the receiver group, and the gun was completely [illegible] assembled.

In 3 week, the first hour was given to testing of magazines and ammunition and a 30 minute quiz. The second hour was given to "Points

before, during and after Flight", the third to slow change of parts (extractor and stop and rebound pawls) and the fourth hour to a lecture on stoppages.

In F week, the first hour was given to a talk on care and cleaning of the Lewis gun, and a 30 minute quiz on the work covered in E week. This was followed by two hours given to the demonstration of stoppages. The fourth hour was given to magazine drill, using the infantry type magazine.

By this time the student had acquired a fair knowledge of all parts of the gun, and the subject of sighting was given three of the five hours in FX week. The remaining two hours were given to "time change of parts" and "care and cleaning respectively. At this time the guns were stripped completely and thoroughly cleaned.

In G week, the first hour was given to a review of the points to be observed before, during and after flight, followed by an hour of testing magazines and ammunition and a 30 minute quiz. The remaining hours were given to drill in the three minute strip, and care and cleaning. G week was designated to be a review of all previous work, as the one hour final examination on the Lewis gun occurred at the beginning of H week.

In H week there was no Lewis gun instruction, the first one hour final on the Lewis gun being given in this week. Marlin gun instruction then took place and there was no further Lewis gun instruction until after the first Marlin gun final examination in L week. At this time one hour was devoted to a review of Lewis gun mechanism and nomenclature and in M week one hour to a review of Lewis gun stoppages and nomenclature. The two hour final examination on both guns concluded the work in M Squadron.

The schedule of instruction referred to above, which has been of so much assistance in maintaining uniformity of instruction, is given for the Lewis gun on the following pages, and Appendix K3 is a copy of the latest edition of the Lewis machine gun syllabus which was furnished to each cadet.

[illegible]

[illegible] given to a talk on care and [illegible] minute quiz on the work covered [illegible] two hours given to the demonstration [illegible] given to machine drill, using the [illegible].

[illegible] the student had acquired a fair knowledge of all [illegible] and the subject of sighting was given three of the [illegible] week. The remaining two hours were given to "time [illegible]" "care and cleaning respectively. At this time [illegible] completely and thoroughly cleaned.

[illegible] given to a [illegible] to be [illegible] of [illegible] hours [illegible] [illegible] [illegible].

[illegible] was no Lewis gun instruction, the first one hour [illegible] given in this week. Marlin gun instruction [illegible] was no further Lewis gun instruction until after [illegible] examination in L week. At this time one hour [illegible] Lewis gun mechanism and nomenclature and in M [illegible] of Lewis gun stoppages and nomenclature. The [illegible] on both guns concluded the work in M Squadron.

[illegible] instruction referred to above, which has been of [illegible] uniformity of instruction, is given for [illegible] pages, and Appendix K3 is a copy of the [illegible] edition of the Lewis machine gun syllabus which was furnished to [illegible].

Instruction-Gunnery.

Lewis Machine Gun

Subject Outline
To be regarded as confidential.
Not to be shown to students.

C Squad.	a general description.
4 hours.	a' " "
Mr. Gay	a" " "
	b Mechanism
D Squad	b' Mechanism and 30 minute quiz.
4 hours.	c Slow change of parts, no time recorded. (feed pawl ejected)
Mr. Lingle	d Magazine drill, using strap handle magazine.
	b" Mechanism.
E Squadron	h Testing magazine and ammunition. 30 minutes quiz.
4 hours.	g Points before, during and after flight.
Mr. Berglund	e' Slow change parts (Extractor, stop and rebound pawls).
	e Lecture on stoppages
F Squadron	f Care and cleaning. 30 minute quiz.
4 hours.	e' Demonstration of stoppages.
Mr. Johnson	e" Demonstration of stoppages.
	d' Magazine drill using infantry type magazine.
Fx Squadron	3 Talk on ring sight.
5 hours	3' Aiming practice using ring sight.
Mr. Munsman.	3" Talk on wind vane sight.
	e" Time change of parts--time recorded--Stop and rebound pawls-(Cartridge guide, Extractor).
	f' Care and cleaning.
G Squadron.	d" Drill (3 minute strip.)
4 hours	f" Care and Cleaning
Mr. Weston.	g' Points to be observed before, during and after flight.
	h' Testing magazines and ammunition, 30 minute quiz. (sighting)
H Squadron	Lewis Gun Examination
L Squadron	Mechanism, Lewis Gun Review
M Squadron	Stoppages, Lewis Gun Review Examination, Lewis and Marlin Guns

- Subject Outline-

To be regarded as confidential.

Not to be shown to students.

Note:- Cadets are to remain at attention until told to handle gun by instructor, or nature of hours work is explained. If this rule is adhered to during their first week on the gun, no further information on this point should be necessary. Any cadet failing to be observed this rule should be reprimanded, and if circumstances warrant, a delinquency report should be made.

Subj.	Week	
a	C	General description, including general classification of all machine guns, especially the Lewis. 1st. method of operation, 2nd. method of cooling, 3rd. method of feeding. Cadets should know that there is a Lewis British infantry and American aircraft gun. Give weight but do not discuss differences. They will be taken up later. Instructor strips gun of working parts. Explain briefly, using British and American nomenclature. (a) How gas operates piston rod. (b) " Return Spring operates piston rod. (c) " magazine is rotated. (d) " cartridge is fed into chamber and ejected. (e) " Gun is fired. See that cadets have syllabus and advise them to procure Lewis Hand book at tool room.
a'	C	General description. Ask questions around the class on all work of -C (a)-going over cycle and nomenclature, British and American. Continue with functions of important parts. Demonstrate proper handling of parts at every opportunity. Discuss the conditions which affect the "rate of fire". Instruct in the use of the dummy round in stripping the gun.
a"	C	General description- Cadets strip gun in presence of instructor. They should alternate in stripping and assembling. Discuss the difference between the ground gun and the American aircraft gun-guns free to traverse and fixed mount gun.
b	C	Mechanism. Instructor strips gun. Do not strip further than taking radiator from rear radiator casing. Give names of parts but no detailed description, as this will be given in D week. Special attention should be given to Cycle, to

Subj.	Week	
a	C	General description, including general classification of all machine guns, especially the Lewis. 1st. method of operation, 2nd. method of cooling, 3rd. method of feeding. Cadets should know that there is a Lewis British infantry and American aircraft gun. Give weight but do not discuss differences. They will be taken up later. Instructor strips gun of working parts. Explain briefly, (a) How gas operates piston rod. (b) " Return spring operates piston rod. (c) " magazine is rotated. (d) " cartridge is fed into chamber and ejected. (e) " Gun is fired. See that cadets have syllabus and advise them to procure Lewis Hand book at tool room.
a'	C	General description. Ask questions around the class on all work of -C (a)-going over cycle and nomenclature, British and American. Continue with functions of important parts. Discuss the conditions which affect the "rate of fire".
[illegible]	C	General description- Cadets strip gun in presence of instructor. They should alternate in stripping and assembling. Discuss the difference between the ground gun and the American aircraft gun-guns free to traverse and fixed mount gun.
[illegible]	C	Mechanism. Instructor strips gun. Do not strip further than taking radiator from rear radiator casing. Give names of parts but no detailed description, as this will be given in D week. Special attention should be given to Cycle, to

Instruction-Gunnery.

- Subject Outline-

To be regarded as confidential.
Not to be shown to students.

Subj.	Week.	
b	C	Working parts and British and American nomenclature. Last Twenty (20) minutes, instructor should demonstrate changing objector, feed pawl, tension, etc.
b'	D	Mechanism-30 minutes quiz. Review by asking questions, also B & A nomenclature.
b"	D	Mechanism-Instructor strips gun completely. Explain in detail every feature of barrel, barrel band radiator etc. Explain where wear can be expected. Each part should be assembled as soon as finished. Check nomenclature at all times.
b"'	L	Mechanism- Review of Lewis gun.
c	D	Slow change of parts--no time recorded. Impress that accuracy and precision of movement in changing of parts is absolutely essential and that speed will come of its own accord later. Demonstrate the proper method of handling all parts in the changes to be made this particular hour. Every test should start with the cadet holding gun as in the firing position; that is, right hand on spade grip, left hand grasping pistol grip. Then remove the magazine. The test should end with cadet replacing the magazine, relaying the gun and firing. (In all tests, only pull charging handle back a short distance. During this hour the following changes are to be made. (a) Extractor. (b) Stop and rebound pawls
c'	E	Slow change of parts-no time recorded--follow instructions as given in D (c). During this hour the following changes are to be made. (a) Extractor. (b) Stop and rebound pawls.
c"	Fx	Time change of parts-record time-Student should handle parts correctly, regardless of length of time taken to make the change. During this hour the following changes are to be made. (a) Cartridge guide spring. (b) Extractor. (c) Stop and rebound pawls.

Last twenty (20) minutes, instructor should demonstrate changing objector, feed pawl, tension, etc.

also 2 & A nomenclature.

D Mechanism-instructor strips gun completely. Explain in detail every feature of barrel, barrel band radiator etc. Explain where wear can be expected. Each part should be assembled as soon as finished. Check nomenclature at all times.

Mechanism- review of Lewis gun.

D Slow change of parts--no time recorded. Impress that absolutely essential and that speed will come of its own accord later. Demonstrate the proper method of handling all parts in the changes to be made this particular hour. Every test should start with the cadet holding gun as in the firing position; that is, right hand on spade grip, left hand grasping pistol grip. Then remove the magazine. The test should end with cadet replacing the magazine, relaying the gun and firing. (In all tests, only part changing needs mention.) distance.

During this hour the following changes are to be made.

(a) Instructor.

E Slow change of parts-no time recorded--follow instructions as given in D (c).

During this hour the following changes are to be made.

(a) Instructor.

(b) Stop and rebound pawls.

During this hour the following changes are to be made.

(a) Cartridge guide spring.

(b) Instructor.

(c) Stop and rebound pawls.

Instruction-Gunnery.

Subject Outline
To be regarded as confidential.
Not to be shown to students.

Subj.	Week	
d	D	Magazine drill--Place sights on guns--Use two strap magazine this hour in making four changes. Hold magazine correctly. Start test with magazine on post and hands holding gun in firing order . Apply immediate action with eye on target, by rotating magazine sharply clockwise with left hand. Grasp magazine, release catch, then place magazine on the table removing hand from strap. Hold second magazine correctly, place on post. With hand still in strap, rotate and attempt to lift off post to see if latch is holding. Grasp the spade grip with the right hand and with the left pull back cocking handle short distance, allow to snap forward. Grasp pistol grip firmly with left hand. Lay sight on target, press trigger. Report above operation with four changes of magazine.
d'	F	Magazine drill-follow D (d) with exception of using infantry magazine in place of strap magazine. Care must be taken that fingers are under magazine center block and thumbs on top plate.
d"	G	Drill in change of all moving parts. Time alloted three (3) minutes. See stencil.
e	E	Lecture on stoppages.
e'	F	Demonstration of stoppages-75% of all stoppages and james can be remedied by adhering to care and cleaning. Demonstrate position of cartridge or shell in every case possible. Explain 1st. immediate action, 2nd. steps to be taken after immediate action 3rd. definition of stoppages and jams. Explain use of the clearance plug and the charging handle extension.
e"	F	Demonstration of stoppages-Ask questions around class of all points as explained in F - (e').
e"'	M	Review stoppages--Lewis gun.
f'	Fx	Care and cleaning 30 minute quiz. Review and ask questions on oiling, powder fouling, metal fouling etc.
f'	Fx	Care and cleaning-strip gun completely clean and oil as tho it had been fired over five hundred rounds, and then to be put away. Explain difference if it is to be used at once. Be sure students understand how to remove all kinds of fouling. Guns to be cleaned ~~for~~ in this hour.

Drill in change of all moving parts.

Lecture on stoppages.

Demonstration of stoppages-75% of all stoppages and jams can be remedied by adhering to care and cleaning. Demonstrate position of cartridge or shell in every case possible.
Explain 1st. immediate action, 2nd. steps to be taken after immediate action 3rd. definition of stoppages and jams.
Explain use of the clearance plug and the charging handle extension.

Demonstration of stoppages-Ask questions around class of all points as explained in F - (e').

Care and cleaning 30 minute quiz. Review and ask questions on

Care and cleaning-strip gun completely clean and oil as the it had been fired over five hundred rounds, and then to be put away. Explain difference if it is to be used at once. Be sure students understand how to remove all kinds of fouling.
Guns to be cleaned ~~for~~ in this form.

Subject Outline.

To be regarded as confidential.
Not to be shown to students.

Subj.	Week	
f"	G	Care and cleaning-Strip guns completely, clean and oil as in f-f'). Ask questions around class.
g	E	Points before, during and after flight. If time permits take up subject of oiling. In this hour explain in detail the reason for each step as taken up in the syllabus. Explain difference between cleaning after a few rounds or after five hundred rounds. Pass deflector bag.
g'	G	Points before, during and after flight. Ask questions around the class on all points as explained in (g). By their answer determine which points need extra explanation.
h	E	Test magazine and ammunition-30 minute quiz. Follow syllabus, and explain fully. The testing of ammunition is very important as the passing of one defective round, through carelessness, may cause very serious results in the air. Show sample of 1/2 section of ammunition.
H'	G	Test magazine and ammunition. 30 minute quiz on sighting. Ask questions around class on all points taken up in (h). Discuss the fifling.
3	Fx	Lecture on ring sights.
3'	Fx	Aiming practice with dummy guns.
3"	Fx	Lecture on wind vane sights, also the combination of principal involved in the use of both wind vane and ring sight.

Instruction-Gunnery.

i.- Instruction-Marlin Gun: Instruction in the Marlin gun was undertaken under the twelve weeks' curriculum of April 1, 1918. When instruction was first authorized only five members of the staff had received any instruction in that gun and it was necessary for them todemonstrate the features of the gun to the other members of the staff.

Instruction in the Marlin gun began in H week, directly after the one hour final on the Lewis gun. The first three hours were given to general description, the instructor stripping the gun. The detail of instruction for the first five hours on the Marlin gun is given in the Marlin syllabus, attached to this report as Appendix.K3.The fourth hour was given to stripping by the students, the men alternating in stripping and assembling the gun. The fifth hour was given to drill in loading and unloading, special attention being paid to nomenclature in this week.

The instruction in I week consisted of two hours of mechanism, covering the entire gun: The third hour was spent in stripping by the students, the fourth hour in a discussion and demonstration of stoppages and jams and immediate action, the fifth hour to care and cleaning of the gun.

The work in K squadron was devoted to one hour of stripping by students, one hour of stoppage demonstration, with a thirty minute quiz on the work in H and I weeks, one hour on care and cleaning, one hour on points to be observed before, during and after flight and one hour of drill in loading and unloading. The guns used for care and cleaning at this time had just been used by the instructors on the range, so that the cadets became more familiar with the parts which are subject to fouling and carbon deposits.

In L week, the first hour was given to drill in loading and unloading and the second hour to a review of mechanism in order to prepare for the third hour, which was final examination on the Marlin gun. The fourth hour was given to stoppage demonstration.

The two hours in M week were given to points to be observed before, during and after flight and to a review of mechanism. This was followed by the two hour final examination on both the Lewis and Marlin guns

Instruction in the Martin gun began in H week, directly after the Lewis gun. The first three hours were given to theoretical study. The instructor stripping the gun. The detail of instruction for the first five hours on the Martin gun is given in the Martin guidebook, attached to this report as Appendix.K3. The fourth hour was given to stripping the students, the men alternating in stripping and assembling the gun. The fifth hour was given to drill in loading and unloading, special attention being paid to assembling in this work.

Instruction in I week consisted of two hours of theoretical study, the third hour: The third hour was spent in stripping by the students, the instructor in a discussion and demonstration of stoppages and immediate action, the fifth hour to care and cleaning of the gun.

In K week in K squadron was devoted to one hour of stripping by students, one hour of stoppage demonstration, three hours practice on the work in H and I weeks, one hour on care and cleaning, one hour on [illegible] in loading and unloading. The guns used for care and cleaning at this time had just been used by the instructors on the range, so that the cadets became more familiar with the parts which are subject to fouling and carbon deposits.

In L week, the first hour was given to drill in loading and unloading and the second hour to a review of mechanism in order to prepare for the third hour, which was final examination on the Martin gun. The fourth hour was given to stoppage demonstration.

The two hours in M week were given to points to be observed be- [illegible] ed by the two hour final examination on both the Lewis and Martin guns

Instruction-Gunnery.

In order to facilitate instruction in the operation of the parts of the lock, two models were made from spare parts which clearly showed the relation and operation of all parts during the cycle of the gun. These models are shown in the photograph on page 165 , and were constructed by simply mounting the parts on a piece of wood.

Another installation useful for instruction purposes was a simple and inexpensive mount for the Marlin gun, which was used for drill in loading and unloading. This consisted of steel plates fastened to a piece of wood approximately 24" long. Bolts were inserted through the steel plates and the mounting attachments of the gun. On the lower side of the wood mount was a dowel 1" in diameter and about 2" long, which was inserted in a hole in the top of the table, so that there was a rigid support which did not slide when the charging slide was brought to the rear. This device was referred to earlier in the report and a picture of same is shown on page 145 .

The dummy rounds used with both the Marlin and Lewis guns were spun on a lathe as per suggestions from Washington. This spinning greatly improved the usefulness of the dummy rounds, especially those of the British .303 type where the case was crimped into the canelure of the bullet. With the U.S. 30 dummy, crimping at the base of the bullet prevented the bullet from being pushed in, but did not prevent it from being pulled out. To prevent this, the bullets were also sweated into place. This method prevented any trouble due to the bullet becoming loose, and the dummy cartridges lasted until the cartridge extractor destroyed the base of the cartridge.

The schedule of instruction for the Marlin gun as laid out for the twelve weeks' course in April 1, 1918, is given on the following pages. This is practically the same work as was given under the curriculum of October 14, 1918, after the course in Gunnery had been shortened from five to three weeks and the instruction on the Lewis gun eliminated. Appendix K3 , contains a copy of the latest edition of the Marlin gun syllabus which was furnished each cadet.

[illegible]

[illegible] tuation in the operation of the [illegible] from spare parts which clearly [illegible] parts during the cycle of the [illegible] photograph on page 168, and were [illegible].

[illegible] instruction purposes was a [illegible] gun, which was used for [illegible] of steel plates fasten- [illegible]. Bolts were inserted through [illegible] members of the gun. On the lower [illegible] in diameter and about 3" long, [illegible] of the table, so that there was [illegible] the charging slide was brought [illegible] earlier in the report and a [illegible].

[illegible] rounds, especially those of the British [illegible] ped into the cavalcade of the bullet. With [illegible] the base of the bullet prevented the bullet [illegible]. This method pre- [illegible] occurring loose, and the dummy [illegible] extractor destroyed the base of the [illegible].

[illegible] motion for the Marlin gun as laid out for [illegible] 1, 1918, is given on the following pages. [illegible] as was given under the curriculum of Oc- [illegible] 1, 1917, after the [illegible] in Summary had been shortened from five to [illegible] on the Lewis gun eliminated. Appendix K3, [illegible] last edition of the Marlin gun systems which was [illegible].

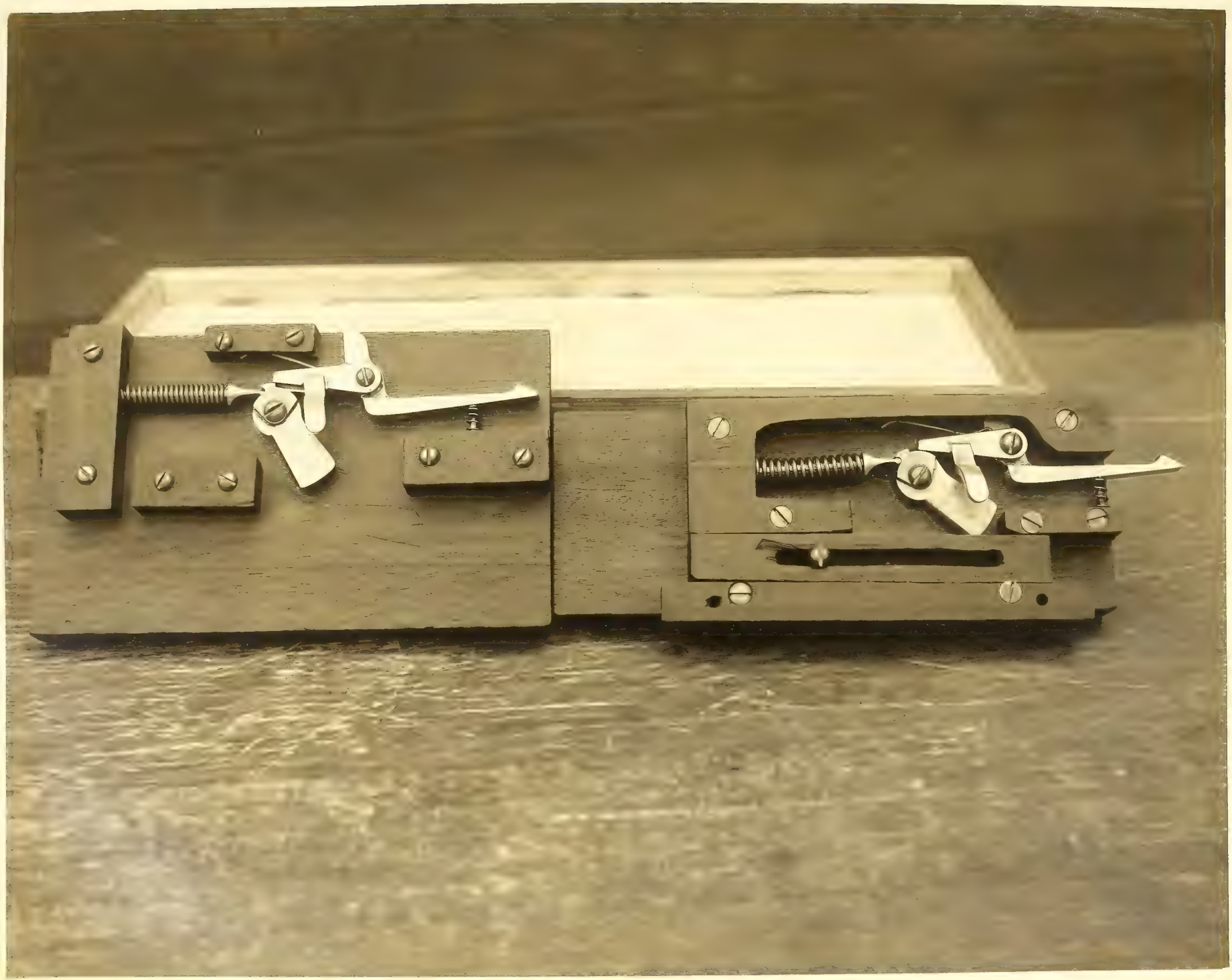

Plate No. 27 - Lock models for Marlin Machine Gun.

Instruction-Gunnery.

OUTLINE OF GUNNERY INSTRUCTION
Marlin Gun

Subject	Description
A1	First hour of General Description General talk on machine guns. Classification as to (1) Method of operation (2) Method of feeding (3) Method of cooling. Give classifications of Marlin, Lewis, Vickers, Colt, Heavy Browning and Light Browning guns. Explain briefly the principles of operation of Marlin gun.
A2	General Description-2nd hour. Follow old outline as given under A in Marlin Syllabus.
A3	General Description-3rd hour Follow old outline as given under A1 in Marlin syllabus.

B1	Mechanism-1st hour. Follow old outline as given under A" in Marlin syllabus.
B2	Mechanism-2nd hour. Follow old outline as given under B in Marlin syllabus. Covers Gas cylinder, slide and piston, cartridge extractor, carrier.
B3	Mechanism-3rd hour. Follow old outline as given under B' in Marlin syllabus. Covers-bolt, lock, trip, ejector, feed mechanism.
B4	Mechanism-4th hour. Review work of 2nd and 3rd hours, asking questions.
B5	Mechanism-5th hour. Review work of 2nd and 3rd hours, asking questions.
B6	Mechanism-6th hour. Review work of 2nd and 3rd hours, asking questions. This is last hour before final examination, so cover all possible points on mechanism.

C1	Stripping- 1st hour. Follow order of stripping as given in stencil. Cadets alternate in stripping and assembling. Explain reasons for precautions used in stripping and assembling gun.

A1 First hour of General Generation
General talk on machine guns. Classification as to (1) Method of operation (2) Method of feeding (3) Method of cooling.
Give classifications of Martin, Lewis, Vickers, Colt, Heavy [illegible].
Explain briefly the principles of operation of Martin gun.

A2 [illegible]
[illegible] under A [illegible].

A3 General Description-one hour
Follow old outline as given under A1 in Martin syllabus.

B1 Mechanism-1st hour.
Follow old outline as given under A" in Martin syllabus.

B2 [illegible]
Follow old outline as given under B in Martin syllabus.
Covers Gas cylinder, slide and piston, cartridge extractor, carrier.

B3 Mechanism-3rd hour.
Follow old outline as given under B' in Martin syllabus.
[illegible]

B4 [illegible]
Review work of 2nd and 3rd hours, asking questions.

B5 Mechanism-4th hour.
Review work of 2nd and 3rd hours, asking questions.

B6 Mechanism-5th hour.
Review work of 2nd and 3rd hours, asking questions.
This is last hour before final examination, so cover all possible points on mechanism.

C1 Stripping- 1st hour.
Follow order of stripping as given in stencil.
Debate alternate in stripping and assembling.
Explain reasons for precautions used in stripping and assembling gun.

OUTLINE -Marlin Gun- Cont 'd.

C2 Stripping- 2nd hour.
Cadets alternate in stripping and assembling. Check over precautions. See that parts are laid down in an orderly manner.

C3 Stripping-3rd hour.
Each cadet tomake complete strip and assembly. Explain method of using trip guage.

C4 Stripping- 4th hour.
Each cadet to make complete strip and assembly. Review use of trip guage. Impress necessity for orderly arrangement of parts, telling how points are deducted on stripping test.

C5 Stripping-5th hour.
Stripping Test. (Value-100%) Tell cadets test must be passed.
Deductions made as follows:
Mistakes in order of stripping or assembling, each 5%
Dropping of parts " 5%
Taking over 2 minutes to assemble action spring 5%
If parts not arranged in systematic manner deduct) from 5% to 10%, depending on how poorly they are arranged) 5% - 10%
Tell other cadets present to remain quiet during test, or 10% will be deducted from their own results.

D1 Loading and Unloading- 1st hour.
Cadets practice loading and unloading. Use of belt filling machine to be demonstrated. Reason for placing gun at half-cock in loading and full cock in unloading to be told.

D2 Loading and Unloading - 2nd hour.
Review work of 1st hour. Each cadet to load belt in filling machine and to load and unload gun.

E1 Stoppages- 1st hour.
Talk on stoppages, following outline in syllabus and using stoppage charts.

E2 Stoppages-2nd hour.
Demonstration of stoppages listed in syllabus. Demonstration of immediate action.

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stripping and assembling. Check over pre-
[illegible] parts are laid down in an orderly manner.

[illegible]

Stripping- 4th hour.
Each cadet to make complete strip and assembly. Review use of
trip gauge. Impress necessity for orderly arrangement of parts.

[illegible]

Tell cadets test must be passed.

Taking over 2 minutes to assemble action spring 8%
If parts not arranged in systematic manner deduct)
arranged)
Tell other cadets present to remain quiet during test, or
10% will be deducted from their own results.

[illegible] - 1st hour.
[illegible]ete practice loading and unloading. Use of belt filling machine
to be demonstrated. Reason for placing gun at half-cock in loading
and full cock in unloading to be told.

[illegible] Unloading - 2nd hour.
[illegible]
and to load and unload gun.

[illegible]- 1st hour.
Talk on stoppages, following outline in syllabus and using stoppage
charts.

[illegible]- 2nd hour.
Demonstration of stoppages listed in syllabus. Demonstration of
[illegible]

Instruction-Gunnery.

OUTLINE- Marlin Gun - Cont'd.

F1 Care and Cleaning - 1st hour.
Explain necessity for light oil which does not congeal at low temperatures. Explain three types of fouling and how removed. Use notes on fouling from Lewis gun syllabus. Remove these sheets from Lewis syllabus and give to students. Clean guns.

F2 Care and Cleaning - 2nd hour.
Review work of first hour, cleaning guns at same time.

F3 Care and Cleaning- 3rd hour.
Review work of first hour, cleaning guns and asking questions.

G1 Points Before, During and After Firing - 1st hour.
Follow syllabus as given in notes on page 7. Explain thoroughly need for adjustments made.

G2 B.D.A. - 2nd hour
Review work of 1st hour, asking questions.

C.C. Gear- 1st hour.
Talk on synchronizing gears, using chart for explanations. Give out syllabus.

C.C. Gear - 2nd hour.
Review operation of gear, and demonstrate each part of gear.

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31 Sights - 1st hour.
Lecture. Definitions. Variables.

32 Sights - 2nd hour.
Lecture- Principles of ring sights.

33 Sights- 3rd hour.
Lecture. Deflection, Foreshortening.

34 Sights. - 4th hour.
Aiming practice.

35 Sights. - 5th hour.
Lecture- Wind-vane sight.

Martin Gun - Cont'd.

Cleaning - 1st hour.
necessarily for light oil which does not congeal at low
. Explain three types of fouling and how removed.
ing from Lewis gun syllabus. Remove these sheets
and give to students. Clean guns.

- 2nd hour.
, discuss

- 3rd hour.
, discuss the method

- 4th hour.
, discussion

- 1st hour.
Talk on synchronizing gears, using chart for explanations. Give out
syllabus.

C.C. Gear - 2nd hour.
Review operation of gear, and demonstrate each part of gear.

- 1st hour.
, demonstration, discussion.

- 2nd hour.
- demonstration of gear sights.

Sights- 3rd hour.
, discussion, discussion.

Sights. - 4th hour.
, discussion.

- 5th hour.
Lesson - Gun - Lewis.

Instruction-Gunnery.

k. Instruction- Vickers Guns: The instruction given on the Vickers gun covered such a short period that no syllabus of instruction was prepared. The work on this gun was carried out for a few weeks only and was discontinued in December 1917 upon orders from Washington.

l. Instruction-Bombs and Aerial Tactics. The Department of Gunnery throughout the eight weeks' course gave lectures on Bombs and Bombing. These lectures were devoted almost entirely to talks on types of bombs with one hour for recitations and questions as no laboratory equipment was available for this work. With the institution of the twelve weeks' course the lectures on Bombs and Bombing were dropped from the Gunnery Department and no instruction on this subject was given from that time on. In the revised curriculum of October 14, 1918, a course in Bombing was provided; this, however, was to be given by the Observation Department. Due to the signing of the armistice no cadets have been graduated from this school in the Bombing course.

The three hours on Aerial Tactics scheduled under the eight weeks' course of November 1, 1917, were more or less general lectures on principles and methods of fighting in the air, based on stencils and pamphlets furnished by the War Department and illustrated with various pictures and charts available on the subject. These lectures were discontinued upon orders from Washington before the institution of the twelve weeks' course in March, 1918, and have not again been taken up.

m. Instruction- Sighting: The course in Gunnery from the beginning has always provided for instruction in Sighting and this work was greatly developed in this School. Originally the sighting laboratory was located in the attic of the first laboratory building. Upon the erection of building No. 2, however, space was provided in Room 3 for an elaborate picture target laboratory for sighting practice.

The time alloted to the subject of sighting in O.S. 21 was three hours, this being divided as follows:

1st Hour-Lecture on Ring Sight. Principles of sighting were explained and the difference between sighting at fixed and moving objects pointed out. Problems in the design of ring sights for various speeds of machine and for different positions on the gun demonstrated.

Instruction-Gunnery.

a. Instruction - Lewis Guns: The instruction given on the Lewis gun covered such a short period that no syllabus of instruction was prepared. The use of this gun was carried out for a few weeks only and was discontinued in December 1917 upon orders from Washington.

b. Instruction - Bombs and Aerial Tactics. The department of Gunnery throughout the eight weeks' course gave lectures on Bombs and Bombing. These lectures were devoted almost entirely to talks on types of bomb with one hour for recitations and questions as no laboratory equipment was available for this work. With the institution of the twelve weeks' course the lectures on Bombs and Bombing were dropped from the Gunnery Department and no instruction on this subject was given from that time on. In the revised curriculum of October 14, 1918, a course in Bombing was provided; this course, was to be given by the Observation Department. Due to the signing of the armistice no bombs have been produced from this school in the bombing course.

The three hours on Aerial Tactics scheduled under the eight weeks' course or December 1, 1917, were more or less general lectures on principles and methods of fighting in the air, based on already and popularly furnished by the War Department and illustrated with various pictures and charts available on the subject. These lectures were discontinued upon a date from Washington before the institution of the twelve weeks' course in March, 1918, and have not again been taken up.

c. Instruction - Sighting: The course in Gunnery from the beginning has always provided for instruction in sighting and this work was greatly developed in this school. Previously the sighting laboratory was located in the attic of the first laboratory building. Upon the erection of building No. 2, however, space was provided in room 6 for an elaborate picture target laboratory for sighting practice.

The time allotted to the subject of sighting in U.S. is one hour, this being divided as follows:

1st Hour-Lecture on Sight Sights. Principles of sighting were explained and the difference between sighting at fixed and moving objects pointed out. Problems in the design of sights for various speeds of machine and for different positions on the gun demonstrated.

Instruction-Gunnery.

2nd Hour- Aiming Practice. Students aimed dummy guns equipped with ring and fixed head sights at picture targets. A detailed description of the picture target range and dummy gun is given below.

3rd Hour- Lecture on Wind-vane Sight. Necessity for, and constuction of this sight was explained and problems in the design of wind-vane sights demonstrated. The use of the combination of the ring and wind-vane sights when firing at moving targets from a moving aeroplane was also shown. The students were told that they may later encounter other types of sights than these but that the same principles underlie all types of sights.

It was thoght best that the instruction be divided into two hours of lecture and one hour of sighting in order to be absolutely certain that the student had a thorough knowledge of the fundamental principles, rather than a certain skill in the art of sighting. The one hour of aiming practice was sufficient to acquaint all of the men with the use of the ring sight and the precautions to be observed. Skill in the use of the sights was left to the work in trapshooting, as all shotguns were equipped with ring sights.

A thirty minute test on sighting was given in G week. This usually consisted of four questions, one on the precautions to be observed in using the sights, one on the principles and design of the ring sight, one on the principle and design of the wind-vane sight, and one on the use of the combination of ring and wind-vane sights. This last question usually involved a demonstration in using a sketch.

The work on the picture target range was done with wooden guns equipped with ring and fixed head sights as shown in the pictures on page 152. Students were instructed to hold the gun in the proper manner-right hand on spade grip, left hand on pistol grip, and to keep both eyes open at all times.

Aiming Practice. Students aimed dummy guns equipped with ring and fixed head sights at picture targets. A detailed description of the picture target range and range gun is given below.

Lecture on Wind-vane Sight. Necessity for, and construction of this sight was explained and problems in the design of wind-vane sights demonstrated. The use of the combination of the ring and wind-vane sights when firing at moving targets from a moving aeroplane was also shown. The students were told that they may later encounter other types of sights than these but that the same principles underlie all types of sights.

A thirty minute test on sighting was given in 6 week. This

The work on the picture target range was done with wooden guns

Instruction-Gunnery.

A close up view of the picture target for use in sighting is shown on page 153 . The targets consisted of photographs mounted on boards, of aeroplanes flying at varying angles to the line of sight. These pictures had the same relative size as an actual airplane at a distance of 200 yards. This is the target shown in the photograph on page 153 . In addition to this target, there was a target which had the same number of photographs, but the relative size of the picture was that of a machine at 300 yards. The distance from the firing point to the target was 10 yards.

The point at which the bullet and machine would meet was figured for different speeds of the machine, (75, 100, 125 and 150 miles per hour). Holes were bored through the wooden background and lights of different colors placed behind these holes. Each picture was numbered and the students were directed to aim at certain targets, the speed of the target being designated. The cadet then placed the enemy in what he estimated to be the proper position and his work was checked up by turning on the lights. The line of sight through the small peep of the ring sight and the fixed bead should then point directly at the proper light.

The ring sight on the dummy gun was designed for an enemy speed of 100 miles per hour, so the first instruction was given for enemy speeds of 100 miles per hour. As the student became more proficient, he used the 100 mile ring sight for various speed of the target.

Under the curriculum of October 1918, the subject of sights was given five hours instead of three. These hours were divided as follows:

1st hour. Lecture- General talk on principles underlying subject of ballistics. Brief remarks on application to heavy artillery and to small arms firing. Definitions of terms in use in aerial gunnery and explanation of variables encountered.

2nd hour.-Lecture- Principles of ring sight explained, using notion of sphere of such radius that time of flight of plane equals time of flight of bullet after trigger is pressed. Ring sights for fixed and movable guns designed.

3rd hour.-Lecture- Given to thorough explanation of deflection and foreshortening, Summary of work given in rules for the use of the ring Sight.

4th hour. Aiming practice, using picture targets.

5th hour. Lecture- Wind-vane sight, as given under three hour curriculum.

Instructions.

A close up view of the picture target for use in sighting is shown on page [illegible]. The largest photograph [illegible] inverts, of [illegible] on the line of sight. These pictures are the same relative size as an actual airplane at a distance of 200 yards. This is the target shown in the photograph on page 100. To [illegible] this target, there was a target which had the same number of photographs, but the relative size of the picture was [illegible] of a machine at 100 yards. The distance from the firing point to the target was 10 yards.

The point at which the bullet and machine would meet was [illegible] (70, 100, 150 and [illegible] per hour). Holes were bored through the wooden background and lights of [illegible] and the students were directed to aim at certain targets, the speed of the target being designated. The sights placed the enemy in what [illegible] estimated to be the proper position and his work was checked up by turning on the lights. The line of sight through the small peep of the ring sight and the [illegible] point directly at the [illegible] light.

The ring sight on the dummy gun was designed for an enemy speed of 100 miles per hour, so the [illegible] instruction are given for enemy speeds of 100 miles per hour. As the student becomes [illegible] proficiency, he used the 100 mile ring sight for various speed of the target.

Under the curriculum of October 1918, the subject of sights was given five hours [illegible] of [illegible]. These hours were divided as follows:

1st hour. Lecture- General talk on principles underlying subject of ballistics. Brief remarks on application to heavy artillery and to small arms firing. Definitions of terms in use in aerial gunnery and explanation of variables encountered.

2nd hour.-Lecture- Principles of ring sight explained, using motion of spheres of such radius that time of flight of plane equals time of flight of bullet after trigger is pressed. Ring sights for fixed and movable guns designed.

3rd hour.-Lecture- Given to thorough explanation of deflection and foreshortening. Summary of work given in rules for the use of the ring sight.

4th hour. Aiming practice, using picture targets.

5th hour. Lecture- [illegible] given [illegible] [illegible].

Instruction-Gunnery.

The five hour curriculum made it possible to distribute the work in such a manner that the slowest cadet could obtain a good knowledge of the subject, and was a distinct improvement upon the three hour course.

n. Instruction-Trap Shooting: Instruction in Trap Shooting has always been handled in this School by the Gunnery Department, although under the curriculum of April 1, 1918, it was listed as a part of the organized Sports Department. When the question of Trap Shooting was first suggested in November 1917, the main difficulty in instituting the work in this School seemed to be the question of the proper site. It was finally decided to locate the traps on top of a hill some 500 feet above the campus and approximately one half mile from the campus. This location gave an excellent, clear background for the blue rocks and its nearness to thecampus made it very convenient and necessitated little loss of time. The conditions under which Trap Shooting was conducted are shown in picture on page 173, and the case for storing the shotguns is shown on page 174 .

Four Ideal Leggett Traps and 22 Winchester pump guns were furnished to the school by the War Department together with an adequate supply of ammunition and blue rock. The traps were installed during the Christmas vacation in December, 1917, and the first trap shooting took place in January , 1918. The War Department has considered Trap Shooting to be an excellent aid in the use of the ring sight and this work continued until the close of the school. Approximately 400,000 rounds of ammunition were used in Trap Shooting at this School during the entire course of the work.

The use of the ring sight with the shot gun in trap shooting it is believed originated in this School, the sight being devised by Lt. Jones before he left for Washington. The picture on page 154shows the ring sight as adapted for use on shot guns. Under the eight weeks' curriculum instruction in trap shooting began in squadron D, each squadron thereafter appearing on the range five times.

With the revision of the curriculum in April 1918, when trap shooting was classed as a branch of Organized Sports, the last four weeks of the Sports schedule were devoted to trap shooting at this institution. Two periods of two hours each were alloted to this work each week with an additional hour for instructional purposes prior to appearing on the range.

Instructional Problems.

The five-man revolution made it possible to distribute the work in such a manner that the shooter might be in charge of the subject, and was a distinct improvement upon the three-man course.

2. Instructional Shooting: Instruction in trap shooting has always been handled at this school by the Gunnery Department, although under the curriculum of April 1, 1918, it was listed as a part of the organized Sports Department. Upon the question of trap shooting was first suggested in December 1917, the main difficulty in installing the work in this School seemed to be the question of the proper site. It was finally decided to locate the traps on top of a hill some 500 feet above the campus and approximately one half mile from the campus. This location gave an excellent, clear background of the blue rocks and the necessary in discovering made it very convenient and necessitated little loss of time. The conditions under which trap shooting was conducted are shown in plates on page 173, and the case for storing the shotguns is shown on page 174.

Four Ideal Jackpot Traps and 12 Hindmarsh traps were installed in the school by the Ser Department together with an adequate supply of ammunition and blue rocks. The traps were installed during the Christmas recreation in December, 1917, and the first trap shooting took place in January, 1918. The Ser Department has installed trap shooting to be an essential aid in the use of the ring sight and this work continued until the close of the school. Approximately 400,000 rounds of ammunition were used in trap shooting at this School during the entire course of the work.

The use of the ring sight with the shot gun in trap shooting is believed originated in this School, the sight being devised by Lt. Jones before he left for Washington. The picture on page 175 shows the ring sight as adapted for use on shot guns. Under the sight weeks' curriculum instruction in trap shooting began in squadron D, each squadron thereafter appearing on the range five times.

With the revision of the curriculum in April 1918, when trap shooting was placed as a branch of Organized Sports, the last four weeks of the eight weeks' course devoted to trap shooting at this institution. Two periods of two hours each were allotted to this work each week with an additional hour for instructional purposes prior to appearing on the range.

Plate No. 28 - Trap Shooting on hills back of Campus.

Plate No. 29 - Method of storing shot guns.

Instruction-Gunnery.

Before the students were assigned to Trap Shooting they received instruction in the use of the Norman ring and wind-vane sights and practiced the use of the ring sight with picture targets, as discussed in the paragraph on Sighting. They were then ready for the more practical work of using the ring sight with a target which was actually moving.

The first period at the traps was given to firing from a distance of ten yards at blue rocks thrown directly away from the student. In this work the ring sight itself had no value, but the student rapidly became familiar with the first precaution to be observed for the proper use of the right sight, namely "keep the sights in alignment." Twenty-five shells were fired by each cadet and at this time particular attention was given to men who had a tendency to flinch when firing. Names of these men were taken and all men having this tendency were assigned to the same trap for the second period, and special attention was given to them by the instructor in charge of the Trap Shooting. The percentage of men who required this instruction was rather low, the experience at this School having been that only one man in ten has this tendency to continually flinch.

The second and all subsequent periods were given to firing from a distance of sixteen yards at blue rocks thrown at all angles. This gave good practice in the use of the ring sight, because it was necessary to place the target at different positions inside the ring in order to give the proper lead for the angle at which the bird was thrown from the trap.

The cadets were instructed from the beginning that the proper method of sighting was to keep both eyes open. It was the experience at this School that the men found this difficult the first few times, and that some men could never do it, but that many of them were able to do it after they had had several periods at the traps.

The procedure in use at the traps was as follows:

Five posts were placed at intervals of about ten feet along the firing line, and one cadet was placed at each post, the ammunition being laid on top of the post. The man assigned to post number one, when the instructor said, "Ready", loaded his gun. He then brought the gun to his shoulder, pointed in the direction of the trap, and called "Pull". The man at the pulling handle sprung the trap and the man at post No. 1 fired.

Instruction-Summary.

Before the students were assigned to Trap Shooting they received instruction in the use of the German ring and sight-bar sights and practiced the use of the ring sight with pistols, targets, as described in the paragraph on sighting. They were then ready for the more practical work of using the ring sight with a target which was actually moving.

The first period at the traps was given to firing from a distance of ten yards at blue rocks thrown directly away from the student. In this work the ring sight itself had no value, but the student rapidly became familiar with the first procedure to be observed for the proper use of the ring sight, namely "keep the sights in alignment." Twenty-five shells were fired by each cadet and at this time particular attention was given to men who had a tendency to flinch when firing. Some of these men were taken and all men having this tendency were assigned to the back trap for the second period, and special attention was given to each by the instructor in charge of the Trap Shooting. The percentage of men who required this instruction was rather low, the experience at this School having been that only one man in ten has this tendency to continually flinch.

The second and all subsequent periods were given to firing from a distance of sixteen yards at blue rocks thrown at all angles. This gave good practice in the use of the ring sight, because it was necessary to place the target at different positions within the ring in order to give the proper lead for the angle at which the bird was thrown from the trap.

The cadets were instructed from the beginning that the proper manner of sighting was to keep both eyes open. It was the experience of this School that the men learnt this difficult the first few times, and that some men could never do it, but that many of them were able to do it after they had had several periods at the traps.

The procedure in use at the traps was as follows:

Five posts were placed at intervals of about ten feet along the firing line, and one cadet was placed at each post, the ammunition being laid on top of the post. The man assigned to post number one, when the instructor said, "Ready", loaded his gun. He then brought the gun to the shoulder, pointed in the direction of the trap, and called "Pull". The man at the pulling handle sprung the trap and the man at post No. 1 fired. The

Instruction-Gunnery.

The man at post number two who had meanwhile placed a cartride on the carrier, closed his gun and repeated the action of the man at post number one. This method continued along the line until it was again the turn of the man at post number one, when the entire operation was repeated until all shots were fired.

In the interest of safety the guns were used as single shot guns and not as pump guns. The guns were pointed at all time in the direction of the trap house and when not in use were left at the posts with the breech mechanism open. The cadet was instructed not to turn around when on the firing line and to keep his finger off the trigger when closing the breech of the gun. He was also instructed to wait five seconds after a misfire before ejecting the round, because of the possibility of a "hang fire". Failure to observe these rules resulted in the cadet receiving demerits.

Description of the Sights:

The ring sights used on the shot guns were designed so that a blue rock traveling at right angles to the line of fire had been placed on the edge of the ring in order to have the proper angle of lead. For the varying angles at which the birds were thrown, it was therefore necessary to estimate the corresponding cross-speed and to change this angle by placing the bird at different positions inside of the ring.

Photographs 1, 2, and 3 on page 154 , show the ring and bead sights with which the guns were equipped. The yoke I-d-c, was fastened by two screws to the chamber of the gun as shown in photograph 3. The ring sight I-a slipped into a hole in the yoke, the pin of the ring being split so that a snug fit was assured. A lip on the yoke prevented the ring from turning on this pin as an axis.

The front sight 2, was a bead mounted on a band which slipped snugly over the front end of the barrel. The band was cut through entirely in one place, parallel to the gun. The band being slightly smaller than the barrel thus springs sufficiently to make a close fit. The barrel band had a slot out in it, parallel to the gun and about $\frac{1}{4}$" long. When the band was placed on the gun, the regular sight with which the gun was already equipped entered this slot and the locking wire I-f, which was placed in a grove in the barrel, was turned to lock behind the front sight of the gun.

The two sights, front and back, could be placed on the gun and removed in a short time. The yoke was fastened permanently to the gun and the ring sight pin was merely inserted in the hole in the yoke, while the barrel band was fastened over the muzzle end of the barrel.

The ring sight had a diameter of one inch and was mounted thirteen inches in front of the eye. The bead was of such height that at a distance of 25 yards the line of sights pointed to a spot fourteen inches below the line of the bore of the gun, in order to allow for the dropping of the shot.

In accordance with Memorandum No. 317, sights were constructed in which the ring sight was placed at the muzzle and the bead at the rear. The ring sight was not designed for a blue rock thrown at right angles, but for the maximum angle of which the trap is capable. In this manner a bird thrown at the maximum angle of the trap would appear on the edge of the ring in order to have the proper angle of lead. It was found that a ring of 2" diameter placed at the muzzle would do this. A ring of greater diameter would necessitate the gunner raising his head too far above the butt stock of the gun.

The construction of these sights was similar to the construction described above. The ring was fastened rigidly to the barrel band which was placed over the front end of the barrel and the bead was inserted in the hole in the yoke at the rear of the barrel. The same provision was made for the dropping of the shot. (14" in 25 yards.)

These sights were tried out by several of the instructors, and were found to have the advantage over the original type in that the target stood out more clearly. The greater weight of these ring sights however, had the effect of shearing off the front sight on the barrel after firing about fifty shots, and it was realized that in order to secure the sight firmly to the barrel, it would be necessary to either drill more holes and insert plugs in the barrel or to have the end of the barrel threaded. In view of the guns being the property of the government, this was not deemed advisable, and the experiment on this type of sight was abandoned.

The two sights, front and back, could be placed on the gun and removed in a short time. The yoke was fastened permanently to the gun and the front sight was merely inserted in the hole in the yoke, while the barrel lock was fastened over the muzzle end of the barrel.

The ring sight had a diameter of one inch and was mounted thirteen inches in front of the eye. The bead was of such height that at a distance of 25 yards the line of sight passed on a very inclined angle below the line of the bore of the gun, in order to allow for the dropping of the shot.

In accordance with Memorandum No. 317, sights were constructed in which the ring sight was placed horizontally and the bead at the rear. The ring sight and the designed for a line sight inclined at right angles, for the maximum angle of which the bead is capable. In this manner a line through the maximum angle of which the ring sight appear on the rear of the sight in order to have the proper angle of lead. It was found that a ring of 2" diameter placed at the muzzle would do this. A ring of greater diameter would necessitate the sight being placed far above the line of the gun.

The construction of these sights was similar to the construction described above. The ring was fastened rigidly to the barrel lock which was placed over the front end of the barrel and the bead was inserted in the hole in the yoke in the rear of the barrel. The same problem was made for the dropping of the shot. (14" in 25 yards.)

These sights were tried out by several of the instructors, and were found to have the advantage over the original type in that the barrel could be used as a sighting, the greater weight of these new sights however, had the effect of absorbing off the front sight on the barrel after firing about fifty shots, and it was realized that in order to secure the sight firmly to the barrel, it would be necessary to either drill more holes and insert plugs in the barrel at or near the end of the barrel threads. In view of the guns being the property of the government, this was not deemed advisable, and the experiment on this type of sight was abandoned.

Instruction-Gunnery.

The following table shows the percentage of hits made by the various squadrons during trap shooting. The results shown in this table clearly indicate the superiority of the gun equipped with ring sight. It will be noted that none of the classes using the gun without sights showed the improvement which one would expect from continued practice. As soon as ring sights were added an immediate improvement in the scores was noticed.

It may be thought by some that the addition of ring sights to the gun might result in the failure to develop the instinct to point the gun in the proper direction, which instinct is almost universal among professional trap-shooters. It has been found here that this is not so, for at one period in the final week the ring sights were removed and the scores made without the ring sights were the equal of those previously made with them. This would indicate that the ring sight as attached to the shot gun not only gives practice in the use of the ring sight, but also serves as a rapid method of instruction in trap shooting, as no such improvement was noted among men who did not use the ring sight at all.

TABLE 12.

TRAP SHOOTING AVERAGES

The averages obtained from the beginning up tothe close of the school, are as follows:

CLASS	D	E	F	G	H	Averages
25					37.2	37.2
26				39.5	33.0	36.3
27			44.9	38.2	30.4	37.8
28		39.0	31.6	38.0	31.0	34.9
29	38.8	38.5	34.1	38.4	36.4	37.2
30	42.4	32.9	36.0	46.8	36.4	39.1
31	40.4	34.6	32.4	41.7	c	37.3
32	47.4	34.1	34.2	38.8	56.4	42.1
33	42.0	37.1	37.2	63.3a	41.9	44.3
34	44.4	37.3	48.8a	35.0	45.9	42.1
35	44.4	58.0a	31.7	36.0	45.6	43.1
36	46.1	31.6	37.1	47.6	47.6	42.0
37	52.8	38.5	41.0	c	44.5	44.2
38	36.0	38.4	44.7	42.2	44.6	43.1
39	c	29.2	34.6	41.6	45.0	37.6
40	54.8	33.4	38.6	38.2	39.8	41.0
41	c	c	43.2	34.0	46.9	41.3

The figures given above are the percentages of hits obtained when shooting straightway at a distance of ten yards in D week, and when shooting all angles at a distance of sixteen yards in the following weeks. The figures above the broken line are the results obtained without theuse of ring sights, and the figures below the line are the results obtained with the ring sights.

The above figures are the results obtained in the eight week curriculum. The following page shows the results obtained on the twelve week curriculum.

The letters shown above and following have the legend:

a Shooting straightaway at 10 yards.
b No shooting owing to weather conditions.
d No shooting scheduled for the squadron.

TABLE 17.

TRAP SHOOTING AVERAGES

The averages obtained from the beginning by trap class of the school, are as follows:

Class	D	C	B	A	Averages
35				37.2	37.2
36			39.5	33.0	36.3
37			44.9	30.4	37.8
38		39.0	31.6	31.0	34.9
39	38.8	38.5	34.1	36.4	37.2
40	42.4	32.9	36.0	46.8	39.1
41	40.4	34.6	32.4	41.7	37.3
42	47.4	34.1	34.2	38.8	42.1
43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44	44.4	37.3	48.8a	36.0	42.1
45	44.4	38.0a	31.7	36.0	43.1
46	[illegible]	[illegible]	[illegible]	47.6	42.0
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	36.0	38.4	44.7	42.2	43.1
49	c	29.2	34.6	41.6	[illegible]
50	[illegible]	[illegible]	33.3	39.8	41.0
51	c	c	43.2	34.0	[illegible]

The figures given above are the percentages of hits obtained when shooting straightway at a distance of ten yards in D week, and when shooting all angles at a distance of sixteen yards in the following weeks. The figures above the broken line are the results obtained without throws of ring sights, and the figures below the line are the results obtained with the ring sights.

The above figures are the results obtained in the eight week curriculum. The following page shows the results obtained on the twelve week curriculum.

The letters shown above and following have the legend:

a Shooting straightway at 10 yards.
c No shooting owing to weather conditions.
d No shooting scheduled for the squadron.

Instruction-Gunnery.

Trapshooting averages obtained on twelve week curriculum, and on Bombing, Observing, and Pilot curriculum.

	I			K		L		M	
CLASS	1	2	3	4	5	6	7	8	Averages.
42	43.9	35.1	35.5	36.7	38.4	33.3	36.5	48.5	38.2
43	46.5	32.7	35.3	39.1	46.5	49.2	44.9	49.9	43.0
44	39.9	29.7	35.6	36.4	38.2	41.6	40.6	47.5	38.7
45	46.1	37.1	37.7	36.4	40.7	43.3	36.7	41.9	40.2
46	42.8	28.6	36.6	35.9	43.7	41.0	54.3	52.6	42.0
47	46.9	30.7	39.2	40.0	43.0	49.2	c	51.0	42.9
48	50.1	32.0	37.9	41.3	44.1	42.8	48.4	47.6	43.0
49	46.9	36.9	35.0	39.4	44.5	48.4	50.8	55.8	49.4
50	44.0	c	32.8	41.7	44.8	49.8	45.5	53.4	44.0
51	44.4	39.7	39.1	42.9	45.4	54.4	54.9	54.2	46.0
52	44.9	39.3	41.6	46.6	60.5	59.7	51.5	56.4	51.3
52a	52.7	41.8	42.1	49.3	52.5	50.7	45.8	54.2	48.6
53	50.4	33.7	40.5	44.9	41.6	48.2	52.8	64.8	47.1
54	40.2	41.6	40.3	43.6	42.2	60.9	51.7	52.6	46.9
55	43.7	41.7	38.8	50.0	43.5	c	50.5	52.4	45.9
56	34.8	39.2	44.3	48.1	42.9	55.5	51.2	----	45.1
57	42.1	c	c	43.2	c	c	43.4	----	42.9
58	44.0	41.6	52.5	56.7	53.8	53.7	54.3	----	50.9
59	50.7	c	45.8	53.9	53.2	56.6	56.6	----	52.8
60	44.3	37.6	45.5	48.8	55.6	55.2	55.2	----	48.9
61	48.4	44.5	54.0	53.6	65.6	62.0	62.0	----	55.7
62	60.8	42.4	57.0	56.4	57.4	50.8	50.8	----	53.7
63	69.0	48.5	55.0	65.5	60.2	57.2	70.6	----	60.7
64	56.0	45.1	53.6	53.5	70.9	50.4	65.5	----	52.1
65	51.4	41.0	65.1	61.5	57.6	63.1	52.3	----	55.6
66	44.1	33.9	43.4	48.6	56.8	70.7	52.0	----	47.1
67	53.6	33.7	53.6	51.4	47.7	61.7	d	----	55.3
68	39.6	31.7	c	51.4	d	d	d		41.2
69	49.4	d	d	d	d	d	d		49.4
70	d	d	c	d	d	d	d		00.0
71	44.3	37.2	56.0	Remainder of squadrons graduated in K week.					45.8
72	52.0	d	43.1						47.6
73	d	d	d						00.0
74	Shot once in G week								41.3
75	52.5	49.0	40.2						47.2
76	37.5	d	45.3						41.4
77 & 78	43.1	d	50.6						46.9

The results shown in Col. I are for a distance of 10 yards, the birds being thrown straightaway. The results shown in the other columns are for birds thrown at all angles from a distance of 16 yards.

Trapshooting averages obtained on twelve week curriculum, and on

Lines	I 1	2	3	II 4	5	6	7	8	Averages.
41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43	[illegible]	29.7	36.6	36.4	38.2	41.6	40.8	47.5	38.7
44	[illegible]	37.1	37.7	38.4	40.7	43.3	38.7	41.9	40.2
45	[illegible]	28.8	33.6	35.9	43.7	41.0	34.3	52.5	42.0
46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	o	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	[illegible]	36.9	35.0	39.4	44.5	48.4	50.8	55.8	43.4
49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	39.7	39.1	42.9	45.4	54.4	54.9	54.2	46.0
51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
54	[illegible]	41.6	40.3	45.6	42.2	50.9	51.7	52.6	46.9
55	[illegible]	41.7	38.8	50.0	43.5	o	50.5	52.4	45.9
56	[illegible]	39.2	44.3	48.1	42.9	55.5	51.2	----	45.1
57	[illegible]	o	o	43.2	o	o	43.4	----	42.9
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----	[illegible]
59	[illegible]	o	45.8	53.9	53.2	56.6	56.6	----	52.8
60	[illegible]	37.6	45.5	48.8	55.6	55.2	55.2	----	48.9
61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----	[illegible]
62	[illegible]	42.4	37.0	56.4	57.4	50.8	50.8	----	53.7
63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----	[illegible]
64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	----	[illegible]
65	[illegible]	41.0	65.1	51.5	57.6	65.1	52.3	----	55.6
66	[illegible]	33.9	45.4	48.6	56.8	70.7	52.0	----	47.1
67	[illegible]	33.7	33.6	51.4	47.7	61.7	d	----	55.3
68	[illegible]	31.7	o	51.4	d	d	d		41.2
69	[illegible]	d	d	d	d	d	d		49.4
70	[illegible]	d	o	d	d	d	d		00.0
71	[illegible]	37.2	33.0	Remainder of squadrons graduated in K week.					45.8
72	[illegible]	[illegible]	[illegible]						[illegible]
73	[illegible]	d	d						00.0
74	[illegible]	once in 6 week							41.3
75	[illegible]	49.0	40.2						47.2
76	[illegible]	d	46.3						41.4
77 & 78	[illegible]	d	50.6						46.9

The results shown in Col. I are for a distance of 10 yards, the birds being thrown straightaway. The results shown in the other columns are for birds thrown at all angles from a distance of 16 yards.

Instruction-Gunnery.

o. Instruction C. C. Gear: Instruction in the C. C. gear was authorized as a part of the twelve weeks' course of April, 1918, but did not commence until September, 1918, as instructional material was not received until that time. Considerable difficulty was experienced because of the fact that the nomenclature for the C. C. gear did not agree with the charts furnished. This was remedied by constructing a chart and applying the proper names to the various parts. A syllabus of the course in the C. C. Gear is included as appendix K3 .

p. Safe-guarding the work: The importance of safeguarding the work in Gunnery in order to prevent accidents has been realized at this School and all suggestions from the War Department have been carefully carried out. Special rules have been enforced on the trap shooting range and also on the machine gun range. Every precaution has been taken in the laboratory to prevent live ammunition from getting in the hands of the students and as an additional precaution guns to be used in the laboratory have had the striking pin filed off so that a live round could not be fired even though it should accidently get in the gun.

q. Difficulties and Suggestions: The principal difficulties encountered in carrying out the instructions as directed were those involving nomenclature. This has been especially true in the Lewis ground gun nomenclature and C. C. Gear nomenclature, the trouble being that the charts and nomenclature lists sent out by Washington did not agree. These difficulties were eliminated, however, by constructing charts and applying the proper terms. No difficulty has been experienced with the nomenclature of the Lewis aircraft or Marlin aircraft guns.

It is believed that the policy which was to have been carried out with the Vickers gun under the last curriculum of sending out to the School a special instructor who would teach the members of the staff the new work would have been very satisfactory. Difficulty in obtaining proper instruction on the Marlin gun caused the Gunnery Department to make this suggestion. It is also believed that it would be well worth while where so much valuable equipment is in use by the cadets to have an experienced armorer assigned to the School whose duty it would be to maintain the guns in proper condition.

It is also believed by the members of the Gunnery Department Staff that if stoppage firing were permitted it would greatly facilitate the instruction in this branch of the work.

o. Instruction C. C. Gear: Instruction in the C. C. Gear was authorized on a part of the twelve weeks' course of April, 1922, but did not commence until September, 1918, in instructional matters was not decisive until that time. Considerable difficulty was experienced because of the fact that the commencement for C. C. Gear did not agree with the course Curriculum. This was remedied by making a clear and explicit the proper dates in the various courses. A syllabus of the course in the C. C. Gear is included as appendix K3 .

p. Safe-guarding the work: The importance of safeguarding the work in Germany is some to general accidents has been realized at this School and all suggestions from the War Department have been fully carried out. Special rules have been enforced in the drop machine and also on the machine for repairs. Every precaution has been taken in the laboratory to prevent the accumulation from getting in the hands of the students and to an additional production zone to be used in the laboratory. The bad use existing pin fitted off so that a live round could not be fired even though it should accidentally get in the gun.

q. Utilization by students: The principal utilization of instructional work in instructions is displayed were there is involving manipulation. This has been especially true in the Lewis ground gun manufacture and C. C. Gear dismantling, the students taking when the shaft and connecting lines sent out by Washington did not agree. These difficulties were eliminated, however, by manufacturing shafts and supplying the proper parts. No difficulty has been experienced with the manufacture of the Lewis aircraft or Marlin aircraft guns.

It is believed that the point which was to have been carried out with the vicinity gun under the last curriculum of training and to the sub-i a special instructor who would teach the students of the staff the new work could very well satisfactory. Difficulty in obtaining proper instruction on the Marlin gun caused the Ordnance Department to take this suggestion. It is also believed that it would be well worth while where so much valuable equipment is in use by the students to have a professional armorer assigned to the School whose duty it would be to maintain the guns in proper condition.

It is also believed by the members of the Ordnance Department staff that if stoppage rules were permitted it would greatly facilitate the instruction in this branch of the work.

Instruction - Gunnery.

r. Examinations: Weekly tests and examinations have always been given in the Gunnery Department as prescribed in the various curricula. While operating under the twelve weeks' course of April 1, 1918, weekly tests were given in D.E.F. and G weeks. The final examination on the Lewis gun was given in H week, final on the Marlin gun in L week and the final examination covering the entire work of the Department in M week. Sample examination sheets as given in this department are furnished on the following pages.

Squadron H-40. April 24, 1918.

GUNNERY EXAMINATION.

1. (a) What parts of the Lewis Gun would you examine most carefully hour burrs and wear?
(b) Describe how you would examine the extractors and state what defects should cause rejection.

2. (a) The bolt is always locked before the round in the chamber is primed. Explain briefly how this is accomplished.
(b) If your gun became overheated in firing, would the heat of the barrel cause the fun to continue firing after the trigger was released? State briefly what provision, if any, is made to care for this in the design of the gun.

3. How would you clean the gun after firing a full magazine?

4. Name, in their proper order, the parts which must be removed in order to replace

a. Magazine feed pawl
b. Charging handle
c. Ejector

5. (a) If the ejector broke while firing, state briefly the effect on the gun. Would this be a stoppage or a jamb? State reason for your answer.
(b) State what things affect the rate of fire of the Lewis Gun.

6. How would you oil the Lewis Gun in preparation for flight? State briefly why care should be taken.

7. (a) How does the stop pawl operate, and what is its purpose?
(b) When the gun isin perfect order, what ensures the removal of but one round at a time from the magazine?

8. (a) What is the function of the plunger?
(b) What is the function of the gear stop?

9. What tools or appliances are required in the complete stripping of the gun? State where each is used.

10. (a) Why is the full magazine rotated while being placed on the gun?
(b) What is immediate action? Describe fully and state the circumstances under which it would be applied.

3. How would you clean the gun after firing a full magazine?

4. Name, in their proper order, the parts which must be removed in order to replace

a. Magazine feed pawl
b. Charging handle
c. Ejector

7. (a) How does the stop pawl operate, and what is its purpose?
(b) When the gun is in perfect order, what ensures the removal of but one round at a time from the magazine?

8. (a) What is the function of the plunger?
(b) What is the function of the gear stop?

9. What tools or appliances are required in the complete stripping of the gun? State where each is used.

10. (a) Why is the full magazine rotated while being placed on the gun?
(b) What is immediate action? Describe fully and state the circumstances under which it would be applied.

GUNNERY EXAMINATION.

Squadron M-49. July 19, 1918.
Answer all Questions. Time two hours.
Answers may be supplemented by sketches at the option of the student.

1. Lewis Gun - (a) How would you inspect the pawls before flight?
   (b) Give British and American nomenclature for all parts of the assembled Gear case.

2. Lewis Gun - What foulings occur in the barrel after firing? Explain how each is removed.

3. Lewis Gun - The gun has a loaded magazine on and is cocked but has too much spring tension. How and to what tension would you relieve it, without firing? Tabulate each step.

4. Lewis Gun - List the defects which would cause a cessation of fire due to "Interference of Feed". In each case, state how each would be affected by immediate action.

5. Lewis Gun - (a) Give the caliber and weight of the British Infantry and Marlin aircraft gun.
   (b) How do you test a magazine before refilling?

6. Marlin Gun - Why is the Marlin gun used for synchronizing and not the Lewis? Explain fully.

7. Marlin Gun - Locate and give the functions of the following:
   (a) Ejector spring (b) Chamber bullet guide
   (c) Feed wheel shafts (d) Feed lever stop stud.
   (e) Trip nose.

8. Marlin Gun - Trace the cartridge of the Marlin gun from the time it leaves the belt, till the empty case is ejected.

9. Marlin Gun - How does the Marlin gun assure the cartridge is in the breech and the bolt locked before it is fired?

10. Marlin Gun - (a) What parts of the gun does the receiver carry?
    (b) Which parts cannot be removed until the barrel is removed?

---cOo---

Time two hours.

1. How would you inspect the pawls before flight?
(a) Give British and American nomenclature for all parts of the assembled Gear case.

2. Lewis Gun - What fouling occur in the barrel after firing? Explain how each is removed.

3. Lewis Gun - The gun has a loaded magazine on and is cocked but has too much spring tension. How and to what tension would you relieve it, without firing? Tabulate each step.

4. Lewis Gun - List the defects which would cause a cessation of fire due to "Interference of Feed". In each case, state how each would be affected by immediate action.

5. (a) Give the caliber and weight of the British Infantry and Marlin aircraft gun.
(b) How do you test a magazine before refilling?

6. - Why is the Marlin gun used for synchronizing and not the Lewis? Explain fully.

7. Locate and give the functions of the following:
(a) Ejector spring (b) Chamber bullet guide
(c) Feed wheel shafts (d) Feed lever stop stud.
(e) Trip nose.

8. Trace the cartridge of the Marlin gun from the time it leaves the belt, till the empty case is ejected.

9. How does the Marlin gun assure the cartridge is in the breech and the bolt locked before it is fired?

10. Marlin Gun - (a) What parts of the gun does the receiver carry?
(b) Which parts cannot be removed until the barrel is removed?

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GUNNERY DEPARTMENT.

Squadron M-61 | Final Examination. | Oct. 16, 1918.

Answer all questions. | Lewis & Marlin. | Time two hours.

I.

Marlin Gun - Which parts of the gun guide the cartridge into the breech as the bolt drives it forward? Explain briefly how each part helps to guide the cartridge.

II.

Marlin Gun - Locate and give the function of each of the following:-

(a) Bullet stop - Cartridge stop,
(b) Sear spring,
(c) Bullet point guide.

III.

Marlin Gun - Outline the sequence of action of all parts of the gun operated during the backward action of the gun.

IV.

Marlin Gun - Describe in detail a jam which is caused by a failure of the cartridge extractor to extract the cartridge from the belt. In what position does the bolt stop?

V.

Lewis Gun - (a) List the parts of the Lewis gun which should be oiled before flight. Which should have more frequent oiling?

(b) What is the function of centre key?

VI.

Lewis Gun - (a) How would you inspect the "striker" with the least effort?

(b) Explain in detail how a broken sear spring would affect the operation of the gun.

VII.

Lewis Gun - (a) Explain how and when the gear stop functions.

(b) Explain briefly how the bolt is locked. Do the extractors spring over the base of the cartridge before the bolt locks?

VIII.

Lewis Gun - (a) List the names of the essential parts of the assembled gear casing.

(b) How is the spad grip locked into place on the gun? Locate the Butt latch.

IX.

Lewis Gun - (a) Describe the riflings of the Lewis Gun.

(b) Explain why the Marlin Gun is synchronized and not the Lewis Gun.

X.

C.C. Gear - (a) Trace the action of the "C.C. Gear" after the Bowden control lever is released.

(b) Name six important parts of the assembled Trigger Motor.

I.

Bren - Which parts of the gun guide the cartridge into the breech as the bolt moves forward? Explain briefly how each part helps to guide the cartridge.

II.

Marlin Gun - Locate and give the function of each of the following:-
(a) Bullet stop - Cartridge stop.
(b) Gear spring.

III.

during the backward action of the gun.

IV.

Marlin Gun - Describe in detail a jam which is caused by a failure of the
does the bolt stop?

V.

Lewis Gun - (a) List the parts of the Lewis gun which should be oiled before flight. Which should have more frequent oiling?
(b) What is the function of centre key?

VI.

Lewis Gun - (a) How would you inspect the "striker" with the least effort?
(b) Explain in detail how a broken gear spring would affect the

VII.

Lewis Gun - (a) Explain how and when the gear stop functions.
(b) Explain briefly how the bolt is locked. Do the extractors spring over the base of the cartridge before the bolt locks?

(b) How is the spad grip locked into place on the gun? Locate the Butt latch.

IX.

Lewis Gun - (a) Describe the rifling of the Lewis Gun.
(b) Explain why the Marlin Gun is synchronized and not the Lewis Gun.

X.

C.C. Gear - (a) Trace the action of the "C.C. Gear" after the Bowden control lever is released.

(b) Name six important parts of the assembled Trigger Motor.

10. AIRPLANES DEPARTMENT

a. General: Originally the work covered by the Airplanes Department went under the name of "Theory of Flight", twenty-four hours at that time being devoted to this department covering lectures on "History of Flying", "Theory of Flight", "Types of Machines" and "Care of Machines", with laboratory work on Rigging, Repair and nomenclature. During this early period of instruction the curriculum did not specify the division of time by weeks and the Theory of Flight Department extended practically throughout the entire eight weeks' course.

In the revision of the curriculum of November 1, 1917, the name of the department was changed to Airplanes, the work being practically the same except that no lectures were included on "Theory of Flight", these lectures being transferred to the Aids to Flight Department in the curriculum of November 1, 1917. Under this curriculum the division of work by weeks was prescribed and the work in Airplanes was scheduled to be given in D, E, and F squadrons, being completed in three weeks.

This arrangement was continued until the beginning of the twelve weeks' curriculum in March, 1918. At that time the work in the Airplanes Department was increased to forty-seven hours, instruction beginning in the first week and continuing through eleven weeks of the course. In the revision of April 1, 1918, the number of hours was increased to fifty-five, this later increase being made in order to increase the laboratory work in Rigging and Repair of Machines. The Theory of Flight lectures were again transferred, this time back to Airplanes.

In the last revision of the curriculum, dated October 14, 1918, the work in the Airplanes Department was increased to sixty-one hours, being covered by Pilots in five weeks from the third to seventh inclusive, with the exception of the instruction in penguins coming in the eleventh and twelfth weeks. Bombers and Observers under this last curriculum took twenty-four hours only in the Airplanes Department in the third and fourth weeks of their courses.

b. Staff: At the beginning of the School the provisional head of the Theory of Flight Department was Mr. W. D. Waterman. In September, 1917, he was replaced by Mr. Howard L. McLean (later commissioned Second Lieutenant, A.S.S.C.), who has been head of the Airplanes Department since that time. The excellent organization and instruction in the Airplanes Department have been due to the efforts of Lieut. McLean assisted by an exceptionally strong staff.

The work of the Airplanes Department has been fairly technical in comparison with some of the other departments of the School. For this reason it has been necessary to secure very able men as instructors in this department, especially the men required to give the lecture work. It was necessary that the lecturers should be able to thoroughly grasp the theory involved in the study of airplanes, although it has been the practice in this School to touch upon the theory as lightly as was consistent with the careful instruction given. Technical graduates have been preferred as instructors and have been largely used. The need of experienced airplane men, particularly in the laboratory work, has been

Instructional Personnel

1a. Airplanes Department

a. Lectures: Originally the work assigned by the Airplanes Department was under the name of "Theory of Flight", instructors were at first also being borrowed in this Department giving lectures on "History of Flying", "Theory of Flight", "Types of Machines" and "Care of Engines", with laboratory work on Engine, Propeller and Wing Construction. During that early period of instruction the curriculum did not specify the division of time by weeks and the Theory of Flight Department actually lectured throughout the entire eight weeks' course.

In the revision of the curriculum of November 1, 1917, the name of the department was changed to Airplanes, the work being principally the same except that no lectures were included on "Theory of Flight", these lectures being transferred to the Aids to Flight Department in the curriculum of November 1, 1917. Under this curriculum the division of work by weeks was unspecified and the work in Airplanes was scheduled to be given in 2, 3, and 4 sequences, being completed in three weeks.

This arrangement was continued until the beginning of the twelve weeks' course course in March, 1918. At that time the work in the Airplanes Department was increased to forty-seven hours, instruction beginning in the first week and continuing through eleven weeks of the course. In the revision of April 1, 1918, the hours of work were increased to sixty-five, this later increase being made in order to increase the laboratory work in Rigging and Repair of Machines. The Theory of Flight lectures were again introduced, this time under the Airplanes Department.

In the last revision of the curriculum, dated October 14, 1918, the work in the Airplanes Department was lengthened to ninety-one hours, being devoted to pilots in five weeks from the third to seventh inclusive, with the exception of the instruction in engines coming in the eleventh and twelfth weeks. Bombers and Observers were given special courses consisting of forty-four hours only in the Airplanes Department in the third and fourth weeks of their courses.

b. Staff: At the beginning of the School the provisional head of the Theory of Flight Department was Lt. W. D. Waterman. In September, 1917, he was replaced by Lt. Joseph ... Adams (later promoted Major Adjutant General, U.S.A.), who has been head of the Airplanes Department since that time. The excellent organization and instruction in the Airplanes Department have been due to the efforts of Lieut. McLean assisted by an exceptionally strong staff.

The work of the Airplanes Department has been fairly technical in comparison with some of the other departments of the School. For this reason it has been necessary to secure very able men as instructors in this department, especially the men required to give the lecture work. It was necessary that the lecturers should be able to thoroughly grasp the theory involved in the study of airplanes, although it has been impossible in this School to make use of men who have had practical experience in flying. Instructors were selected for their ability as teachers and their knowledge of the subjects with the courses assigned to them. Technical graduates were from universities in Switzerland and Sweden. The men of experience in airplane work, particularly in the laboratory work, has been

keenly felt at times, especially during the early months of operation. It was later possible to obtain a few experts in Rigging and Repair to serve as laboratory assistants and these men have been extremely helpful in imparting special features of the work to instructors as well as to students. The majority of the instructors, however, have been developed in the department, particularly is this true of the more able instructors of the department who were good engineers when they came to the School.

The organization of the staff of the Airplanes Department has been one of the best. A division of work has been carefully made and because of the exceptionally strong staff it has been possible to detail the different parts of the work to the various instructors in the department. As an example of the method of carrying out the administration of the work in this department, the following shows the apportionment of the work as made in October, 1918.

1. In charge of distribution of instruction - scheduling the work of instruction, instruction, correction of papers and repair work each week so that each instructor averaged between thirty and thirty-five hours of work. Mr. Ball
2. Board of Examiners in charge of preparing all examinations and reviewing all grades for the department. Mr. Erickson, Mr. Bradbeer
3. In charge Laboratory work in Rigging, Lt. Woodruff
4. In charge Splicing Laboratory, Mr. Wells
5. In charge Patching Laboratory, M.S.E. Mittenberg.
6. In charge Penguin Instruction Lieut. Grey.
7. In charge of equipment and tools- keeping spare parts in stock, drawing up plans for new equipment, etc. Mr. Merrick.

A number of strong men have been developed in the department who have taken a keen interest in the work and spent much time in study. Reports have been prepared by members of the staff of the Airplanes Department on a large number of inventions which have been submitted to the School for an opinion from time to time and excellent experience was obtained from the study involved in this work.

A complete list of instructors who have served in the Airplane Department is given in appendix II. From this table certain points of interest regarding the staff of the Airplanes Department are to be noted. A total of eighteen instructors served in this department during the operation of the School, two of these men having also served in other departments. Twelve of these men, sixty-six per cent, served as civilian instructors throughout their entire period of service. Ten were university graduates and three others had had from one to three years university training. Nine of these graduates, or fifty percent of the total staff, were graduates in engineering or sciences and had had practical experience in their line of work. Two airplane builders and one airplane mechanic (M.S.E.) served on the staff.

The maximum number of instructors in this department at any one time occurred during June, July and August, 1918, when fourteen men were giving instruction.

Instruction-Airplanes

This number, taken in consideration with a total staff of eighteen and considering the fluctuations in the size of the School, shows that very few changes were made in the staff of this department. At this time squadrons of from eighty to one hundred men were passing through the School and were being efficiently instructed by a staff of fourteen men.

The average length of service of instructors in the Airplanes Department was somewhat above the average, being 9.1 months as against an average of all departments of 7.7 months.

c. Curriculum Requirements: In discussing breifly the curriculum requirements the curricula of the following dates only will be considered:

Curriculum of June 11, 1917
" " November 1, 1917
" April 1, 1918
" " October 14, 1918

The revisions of September 26, 1917 and March 1, 1918, while somewhat different from the revisions which almost immediately superseded them, were in effect such a short time that no special remarks are required concerning them. The following table showing the hours required under the various topics in the Airplanes Department under the different curricula will be a helpful reference in the discussion of the work of this department.

Table No. 13.

Total Hours Required in Curriculum of

	6/11/17	9/26/17	11/1/17
Theory of Flight			
History of Flying	1		
Theory of Flight	2		
Nomenclature of Airplanes	4		
Types of Machines	1		
Care of Machines	2		
(Repair of Machines			
(Sailmaking & Splicing	3		
Rigging & Landing Gear	9		
Tools	2		
Airplanes			
Types of Machines		2	1
Nomenclature		2	2
Rigging		12	12
Care of Machines		1	1
Repair of Machines		6	6
Examination		2	2

Instructor-Airplanes

This number, when in consideration with a total staff of eighteen and considering the variations in the size of the school, seems that very few changes were made in the staff of this department. At this time approximately four eighty to one hundred men were passing through the school and were being efficiently instructed by a staff of fourteen men.

The average length of service of instructors in the Airplanes Department was somewhat above the average, being 8.1 months as against an average of all departments of 7.7 months.

c. Curriculum Requirements: In discussing briefly the curriculum requirements the contents of the following dates only will be considered:

Curriculum of June 11, 1917
" November 1, 1917
" April 1, 1918
" October 14, 1918

The revisions of September 25, 1917 and March 1, 1918, while somewhat different from the revisions which almost immediately succeeded them, were in effect such a short time that no special remarks are required concerning them. The following table showing the hours required under the various topics in the Airplanes Department under the different curricula will be a helpful reference in the discussion of the work of this department.

Table No. 13.

Total Hours Required in Curriculum of

	6/11/17	9/25/17	11/1/17
Theory of Flight			
History of Flying	1		
Theory of Flight	3		
Nomenclature of Airplanes	4		
Types of Machines	1		
Care of Machines	3		
Repair of Machines			
Assembling & Rigging	3		
Rigging & Repair work	3		
Tools	3		

Airplanes

Types of Machines		3	1
Nomenclature		3	3
Rigging		12	22
Care of Machines		1	1
Repair of Machines		3	3
Assembling		3	2

Instruction-Airplanes

	Total Hours Required in the curriculum of				
			10/14/18		
	3/1/18	4/1/18	Pilots	Bombers	Observers
Airplanes					
Theory of Flight	6	6			
Meteorology	3	3			
Rigging	22	26			
Repair of Machines	8	12			
Instruments	4	4			
Types of Machines	2	2			
Examination	2	2			
Airplanes					
Principles: Theory of Flight			6	6	6
Rigging			25	10	10
Repair of Machines			11	3	3
Instruments			2	2	2
Types of Machines			2	2	2
Penguines			12	-	-
Examinations			3	1	1

The hours devoted to the various topics in the Theory of Flight Department under the curriculum of June 11th, 1917, are shown in the above table.

With the revision of November 1, 1917 the lectures on Theory of Flight and History of Flying were transferred to the Aids to Flight Department. The instructors in the Airplanes Department continued to give this work under the Aids to Flight Department but it has always been the opinion of the Head of the Airplanes Department that this work should be included in the Airplanes Department. The work in Rigging was increased from nine to twelve hours, the work in Repair increased from three to six hours and the lectures on Nomenclature reduced from four to two hours.

In the twelve weeks' curriculum instituted in March and April, 1918, the six lectures in Theory of Flight were transferred back to the Airplanes Department, also three lectures in Meteorology and four lectures in Instruments were added to the work of this department. The work in Rigging and Repair was more than doubled over what had been given in the eight weeks' course. The large increase in Rigging and Repair work was due to the fact that the ground schools were expected to practically cover all the work in these branches which had heretofore been given at the flying schools, and give practical instruction in wing patching and wire splicing. Previously, demonstrations only by the instructor had been given as the time was limited to allow the cadets to do any work.

In the revised curriculum of October 14, 1918, few changes were made in the work of the Airplanes Department. The lectures in Meteorology were transferred to the Observation Department and instruction in Penguins was added, although the work on Penguins was never started due to the signing of the armistice. The shortening of the course from twelve to ten weeks had no effect on the schedule of the

[illegible]

Total hours required in the curriculum of

	3/1/18	4/1/18	10/14/18 Pilots	Bombers	Observers
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					
[illegible]					

[illegible]

[illegible]				
[illegible]				
[illegible]				
[illegible]				
[illegible]				
[illegible]				
[illegible]				

The hours devoted to the various topics in the Theory of Flight Department under the curriculum of June 24th, 1917, are shown in the above table.

With the revision of November 1, 1917 the lectures on Theory of Flight and History of Flying were considerably in the side in Flight Department. The instructors in the airplane department continued to give this work during the time in flying department but it has always been the opinion of the head of the Airplanes Department that this work should be included in the airplane department. The work in Rigging was increased from nine to twelve hours, the work in Repair increased from three to six hours and the lectures on Momenclature reduced from four to two hours.

In the twelve weeks' curriculum instituted in March and April, 1918, the six lectures in Theory of Flight were transferred from the Flight Department, also three lectures in Momenclature and four lectures on Instruments were added to the part of the department. The work in Rigging and Repair was more than doubled and Engines was given 12 hours in the eight weeks' course. The time devoted to Engines and Rigging was due to the fact that the ground schools were expected to practically cover all the work in these branches which had heretofore been given at the flying stations, and give practical instruction in engine-testing and airplane rigging. Previously, practically, instruction only on the instructor had been given on the time that pilots in training had spent on an airplane.

In the revised curriculum of October 24, 1918, the hours were less in the work of the airplane department. The lectures in History of Flying were transferred to the Instruments Department and instruction in Ferrying was added, although the work of ferrying was never started due to the signing of the armistice. The shortening of the course from twelve to eight weeks was by reason of the change in the

Airplanes Department other than eliminating Penguin instruction.

d. Laboratory Space: When the original laboratory building was constructed a space 50' x 60' was provided for the Rigging Laboratory, this space being designed to hold two fully rigged airplanes. Two machines were ample for instruction of squadrons of twenty-five men. With the increase in the size of the squadrons, however, and upon completion of Building No. 2 in November 1917, an addition of 50' x 80' was made to the Rigging Laboratory. This provided space for a total of six machines. An interior view of this laboratory is shown on page 191.

With the large increase in laboratory work in the Airplanes Department required under the twelve weeks' curriculum of April, 1918, it was necessary to provide additional laboratory space and a new laboratory building 48' x 120', shown in the sketch page 61 as Building No. 3, was constructed for use entirely by the Airplanes Department. This building included a Rigging laboratory 48' x 92' and a Repair Laboratory 48' x 28' for work in splicing, wing patching, soldering, etc. This building was completed and in use in May 1918 in time for handling the increased work required under the twelve weeks' curriculum. The pictures on pages 192 and193show the arrangement of equipment in the Repair Laboratory and one squadron doing soldering.

Both of the Rigging laboratories had space available for seating the cadets so that lectures could also be given in these rooms. The buildings were well lighted and well ventilated with the exception of the Repair laboratory. In this room it was found that when the work in patching and doping was being given artificial ventilation was desirable to carry off the dope vapor and keep the room in condition so that instruction could be carried on properly.

e. Laboratory Equipment: For the early work in Rigging two Martin Tractor Type Biplanes, Model TT (SC #330 and 331) were used and were housed in the original laboratory building. Also in the winter of 1917 one Curtiss R-2 and two additional Martins Model TT were received.

The following table shows the machines on hand in April, 1918, and the dates when they were received:

2 Martin TT, S.C. #330(Maker's #13) and S. C.#331(Maker's #12),June, 1917.
1 Curtiss R2, S.C. #68(Maker's #43) Received 10/?/17
2 Martin TT, S.C.#97(Maker's #102) and S.C.#98(Maker's #103) Received 11/1917.
1 Sturtevant S.C. #110 Received 2/1/18.
1 Curtiss JN4D S.C. #39868 Received 3/14/18
1 Curtiss JN4D S.C. #39869 Received 3/30/18

In addition to the above machines one L. W.F. airplane S.C. 2515, equipped with Thomas Morse Motor No. 2393, was received in May, 1918, and two additional Curtiss JN-4 Ds were received in October, 1918, making a total of eleven airplanes received by

Airplanes Department other than aeronautical engineering instruction.

d. Laboratory space: When the original laboratory building was constructed a space 30' x 60' was provided for the Rigging Laboratory, this space being designed to hold two fully rigged airplanes. Two monitors were built for interaction of exhausts of twenty-five men. With the increase in the size of the department, however, and upon completion of Building No. 2 in December 1917, an addition of 30' x 60' was made to the Rigging Laboratory. This provided space for a total of six machines. An interior view of this laboratory is shown on page 141.

With the large increase in laboratory work in the Airplanes Department required during the twelve weeks' curriculum of April, 1918, it was necessary to provide additional laboratory space and a new laboratory building 48' x 120', shown in the photo, page 61 as Building No. 3, was constructed for use entirely by the Airplanes Department. This building included a Rigging Laboratory 48' x 92' and a Repair Laboratory 42' x 28' for work in spliicing, wing patching, soldering, etc. This building was completed and in use in May 1918 to take care of the increased work required under the twelve weeks' curriculum. The pictures on page 142 emphasize the congestion of equipment in the Repair Laboratory and the expansion doing soldering.

Both of the rigging laboratories had space available for seating the cadets in that lectures could also be given in these rooms. The buildings were well lighted and well ventilated with the exception of the repair laboratory, in this room it was found that when the work in patching and soldering was being given artificial ventilation was desirable to carry off the dope vapors and keep the room in condition so that conversations could be carried on properly.

e. Laboratory equipment: For the early work in rigging the Curtiss Trainer Type Airplane, Model TT (See page 21) were used and were found in the original laboratory building. Also in the winter of 1917 two Curtiss H-4 and two Curtiss Martins Model TT were received.

The following table shows the machines received in April, 1918, and the dates when they were received:

2 Martin TT, [illegible]
1 Curtiss H-4, [illegible]
2 Martin TT, [illegible]
1 Curtiss H-4, [illegible]
1 Curtiss JN4D [illegible]
1 Curtiss JN4D S.O. #38869 Received 8/30/18

In addition to the above machines the U.S. Airplane No. 1017, crashed with Thomas Morse No. 4200, was received in May, 1918, and dismantled during June. It was received in October, 1918, making a total of 11 Curtiss airplanes received by


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Plate No. 30 - Rigging Laboratory - Room 12.

Plate No. 31 - Repair of Machines Laboratory - Room 22

Plate No. 32 - Repair of Machines Laboratory - Room 22,
Squadron doing soldering.

this School for instructional purposes. These machines have all been used for instructional purposes with the exception of the Sturtevant, which was not suitable for this work. The Curtiss R-2 was rather heavy for dissassembly and assembly work but has been used on a few occasions when the squadrons were rather large. Its main use has been to illustrate lectures and for practice work on fuselage adjustment. By July, 1918, the two Martin airplanes originally received in June, 1917, were showing the effect of continual disassembly and assembly, having been torn down and assembled more than one hundred times up to that date.

The Repair Laboratory, completed in May, 1918, was equipped with thirteen square tables, it being found that the space could be used more economically with these tables than with benches along the walls. Each table was designed to accommodate four cadets, each table being equipped with four vises, one gas oven and receptacle for soldering acid. In addition a box of tools was made up for each table containing pliers, snips, hammers, wire cutters and other tools necessary for the work in this department.

Additional equipment was mounted in the Rigging Laboratory, propellers of various types and sizes being mounted on the walls where easily inspected and charts and diagrams received from Washington were always available. Two skeleton wing frames with each part tagged with its name were mounted on the wall, one in each building. A stripped fuselage also had the parts labeled so that the cadets could come in the laboratory at any time and study the nomenclature of the ship. Slides and photographs in large numbers were used, particularly in the lectures on Types of Machines and History of Flying.

A small model airplane was donated to the department for instructional purposes and proved useful in the lectures on nomenclature. A propeller balancing stand and checking table were constructed by the department according to the photographs sent to the School from the Director of Military Aeronautics and were used in the propeller lectures.

Jacuzzi Brothers of Berkeley donated for the use of the department a propeller blade cut up in 6" sections and doweled together, also some small model propellers. These were very useful in the lectures given on propeller theory and manufacture.

The spare time of instructors in airplanes was used to keep the equipment in proper condition thus serving the double purpose of gaining experience for the instructors and also keeping all equipment in proper repair.

f. Instruction - General: The instruction in the Airplanes Department has been based on stencils, pamphlets, notes, charts and photographs received from Washington and on parallel reading in books suggested by Washington such as "The Airplane Speaks", "Military Airplanes", etc. The work in the department has been rather varied and at the time of the change to the twelve weeks' course the work in this Department was practically doubled due to the large increase in the work in Rigging and Repair of Machines.

were loaned for instructional purposes. These machines were all seen used for instructional purposes with the exception of one otherwise, which was not in this for this work. The Curtiss R-2 was rather heavy for disassembly and assembly work and was seen used on a few occasions when the engineers were rather large. It was not had been to lift the fuselage, requiring the assembly of a jigger-hoist. By July, 1918, the two Martin airplanes originally received in June, 1917, were showing the effect of continuous assembling and disassembly, having been torn down and assembled more than one hundred times up to that date.

The Repair Laboratory, completed in May, 1918, was equipped with thirteen square tables, it being room for some round the sand were necessarily with these tables than with benches along the walls. Each table was designed to accommodate four cadets, each table being equipped with four vises, one gas oven and receptacle for soldering acid. In addition a box of tools was made up for each table containing files, saws, hammers, pliers, screws and other tools necessary for the work in this department.

Additional equipment was mounted in the Rigging Laboratory, propellers of various types and sizes being mounted on the walls where easily inspected and marked and diagrams showing propeller damages were always available. The skeleton wing frames with each part tagged with its name were mounted on the wall, one in each building. A display cabinet was also provided so that the cadets could come in the laboratory at any time and study the construction of the ship. Sizes and packing in large numbers were used, particularly in the lectures on Types of Machines and History of Flying.

A small model airplane was donated to the department for instructional purposes and serves well in the lectures on aerodynamics. A propeller balancing stand and another were constructed by the department according to the specifications sent to the School from the Director of Military Aeronautics and were used in the propeller lectures.

Lawrence Brothers of Berkeley donated for the use of the department a propeller block and in the "A" assembly and bowled together, also some small model propellers. These were very useful in the lectures given on propeller design and manufacture.

The spare time of instructors in airplanes was used to keep the equipment in proper condition, thus serving the double purpose of giving experience for the instructors and also keeping all equipment in proper repair.

I. Instruction - General: The instruction in the Airplanes Department has been based on available, usually is, books, charts and pamphlets received from manufacturers and on material received in some suggestions by Instruction Book or "The Airplane Spoke", "Military Aviation", etc. The work in the department has been rather varied and at the time of the change to the twelve weeks' course the work in this department was practically doubled due to the large increase in the work in Rigging and Repair of Machines.

Instruction-Airplanes

The following is an outline of the work given by the Department when it was known as the Theory of Flight Department under the original eight weeks' curriculum. This outline shows briefly the number of hours devoted to each subject and the topics discussed.

Outline of the Lecture and Laboratory Work in the
Theory of Flight Department - September, 1917.

I. HISTORY OF FLYING (1 hour - "B" Squadron) - McLean

A general outline of the development of aviation is given from time of da Vinci to the present day. Special emphasis is given to the history of methods of control and development of parts of the airplane, such as the fuselage. Most of the time is spent on the work of Langley, Lilienthall, Wright brothers, Curtiss, Bleriott, Nieuport, and Eiffel.

II. NOMENCLATURE & THEORY OF FLIGHT (6 hours - C, D, E, Squadrons)
Waterman and McLean

First Lecture

Properties of air - air flow around moving objects - resistance to motion - varies as V^2 - air flow over (1) flat plane, (2) cambered plane - lift and drag.

Second Lecture

Lift drag ratio - five factors affecting ratio - (1) angle of incidence, (2) profile, (3) plan form, (4) dihedral, (5) interference, when more than one wing used.

Third Lecture

(1) Lifting capacity, (2), drag, (3) power required to fly, (4) power available - conditions for horizontal flight - margin of power - performances of an airplane - glide - climb.

Fourth Lecture

Equilibrium of machine under action of gravity, drag, lift, and thrust - stability and control - directional stability - keel surface - longitudinal stability - movement of center of lift - longitudinal dihedral - lateral stability - - lateral dihedral - vertical fin - center of gravity - rudders - elevators - ailerons, wing flaps or warping - banking.

Nomenclature - 2 hours

The work in nomenclature will be devoted in general to terms that will be used in Theory of Flight, leaving names of airplane parts to be picked up mainly in rigging laboratory.

III. RIGGING - (9 hours - D, E, F, G, Squadrons) - Waterman, Ball, McLean, Pvt. Frazier.

This course consists at the present time of one hour lecture and eight hours laboratory. The lecture is given by Mr. Waterman and is an introduction to the work in the laboratory. Waterman, Ball, and McLean divide

Instruction-Airplanes

The following is an outline of the work given by the department when it was known as the Theory of Flight Department under the original eight weeks' curriculum. This outline shows briefly the number of hours devoted to each subject and the topics discussed.

Outline of the Lecture and Laboratory Work in the
Theory of Flight Department - September, 1917.

I. HISTORY OF FLYING (1 hour - "B" Squadron) - McLean

A general outline of the development of aviation is given from time of da Vinci to the present day. Special emphasis is given to the history of methods of control and development of parts of the airplane, such as the fuselage. Most of the time is spent on the work of Langley, Lilienthal, Wright brothers, Curtiss, Bleriott, Nieuport, and Nitti.

II. NOMENCLATURE & THEORY OF FLIGHT (6 hours - C. D. M. Squadrons)
Waterman and McLean

First Lecture

Properties of air - air flow around moving objects - resistance to motion - varies as V^2 - air flow over (1) flat plane, (2) cambered plane - lift and drag.

Second Lecture

Lift drag ratio - five factors affecting ratio - (1) angle of incidence, (2) profile, (3) plan form, (4) dihedral, (5) interference, when more than one wing used.

Third Lecture

(1) Lifting capacity, (2), drag, (3) power required to fly, (4) power available - conditions for horizontal flight - margin of power - performances of an airplane - glide - climb.

Fourth Lecture

Stability or machine under action of gravity, drag, lift, and thrust - stability and control - directional stability - keel surface - longitudinal stability - movement of center of lift - longitudinal stability - lateral stability - - lateral dihedral - vertical fin - center of gravity - rudders - elevators - ailerons, wing flaps or warping - banking.

Nomenclature - 2 hours

The work in nomenclature will be devoted in general to terms that will be used in theory of flight, leaving names of airplane parts to be picked up mainly in rigging laboratory.

III. RIGGING - (9 hours - D. M. M. G. Squadrons) - Waterman, Ball, McLean, Pvt. Frazier.

This course consists at the present time of one hour lecture and eight hours laboratory. The lecture is given by Mr. Waterman and is an introduction to the work in the laboratory. Waterman, Ball, and McLean divide

the laboratory work between them.

By scheduling the work done in the laboratory differently we can get more in and the final arrangement will be as follows:

"D" Squadron

Adjustment of classes
Assembly and adjustment of center section
Assembly of one wing panel

"E" Squadron

Erection of wing panels
Adjustment for dihedral angle

"F" Squadron

Adjustment for wash-in
Adjustment for stagger
Assembly of empennage
Adjustment of stabilizers
Adjustment of control surfaces
Tightening and safetying all wires and turn buckles.

"F" Squadron

Checking propeller
Checking fuselage
Checking wing section

IV. CARE OF MACHINES (2 hours - F squadron) - Waterman

V. SPLICING (3 hours - F and G Squadrons) - Ball.

One hour is spent in the laboratory demonstrating how the splices are actually made, the remaining time being devoted to construction and finishing of wing panels.

VI. TYPES OF MACHINES - (1 hour - G Squadron) - McLean.

This lecture covers general types of machines, monoplane, biplane, triplane, single motor tractor and single motor pusher type, double motor machines and marine aeroplanes. Then classes of military airplanes, including pursuit, reconnaisance, bombing and training. The types are shown by the reflectoscope.

[illegible] - [illegible] between [illegible].

By [illegible] the work done in the laboratory differently we can get more in the final arrangement will be as follows:

"A" [illegible]

Adjustment of clasps
Assembly and adjustment of center section
Assembly of one wing panel

"B" [illegible]

Erection of wing panels
Adjustment for dihedral angle

"C" [illegible]

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
Tightening and safetying all wires and turn buckles.

"D" [illegible]

[illegible]
[illegible]
[illegible]

IV. CARE OF MACHINES (2 hours - F squadron) - Waterman

V. RIGGING (3 hours - F and G squadrons) - Ball.

One hour is spent in the laboratory demonstrating how the splices are actually made, the remaining time being devoted to construction and finishing of wing panels.

VI. TYPES OF MACHINES - (1 hour - G squadron) - Molean.

This lecture covers general types of machines, monoplane, biplane, triplane, single motor tractor and single motor pusher type, double motor machines and marine aeroplanes. Then classes of military airplanes, in-[illegible] reconnaissance, [illegible] and training. [illegible] are shown by the reflectoscope.

Instruction-Airplanes

With the revision of the curriculum in November, 1917, the name of the department was changed from Theory of Flight to Airplanes. Stencil No. 37 in Appendix F4 states briefly the instruction to be given under the revised eight weeks' course. The nature of the work in Rigging and the other subjects in the Airplanes Department was very similar to the outline given above for the Theory of Flight Department.

With the institution of the twelve weeks' course in March and April, 1918 the work in the Airplanes Department was practically doubled, the large increase being in the hours devoted to laboratory work in Rigging and Repair, and for a while put a very heavy load on the Airplanes Department due to the overlapping of the schedules. It also happened that about the time of this change the large squadrons due to the transfer of the Ohio men to this School were just passing through the Airplane Department under the old curriculum necessitating the handling of one squadron of one hundred and fifty-two men.

The outline of the work of the Airplanes Department in May, 1918, under the twelve weeks' curriculum of April 1, 1918, was as follows:

Subjects	Hours
Theory of Flight	6 - McLean
Meteorology	3 - Jeffers
Rigging	26 - Staff
Repair of Machines	12 - Staff
Instruments	4 - Jeffers
Types of Machines	2 - Erickson
Final Examination (11th week)	2 -

The work in Rigging included both lectures and laboratory work and was divided as follows:

	Squadron	Hours
Nomenclature	A	1 - McLean
Disassembly (L Split section)	A	1 - Laboratory
Nomenclature	B	1 - McLean
Landing gear (L $\frac{3}{4}$ hour lecture)	B	2 - Erickson & Lab.
Elementary treatment of stresses	B	1 - Woodruff
Center section (L $\frac{1}{2}$ hour lecture)	C	2 - Erickson & Lab.
Mounting motor and instruments, checking fuselage	C	1 - Mittenberg
Materials, woods and metals	C	1 - Woodruff
Wires and fittings	C	1 - Bradbeer
Fabrics and dopes	C	1 - Bradbeer
Dihedral angle, lecture	D	1 - Ball
Dihedral angle, alignment	D	3 - Laboratory
Stabilizers and controls, lecture	E	1 - Ball
Stabilizers and controls, alignment	E	3 - Laboratory

Instructional Problems

Upon the revision of the curriculum in November, 1917, the name of the department was changed from Theory of Flight to Airplanes. General No. 37 in Appendix 14 states briefly the instruction to be given under the revised eight weeks' course. The nature of the work in Rigging and the other subjects in the Airplanes Department was very similar to the outline given above for the Theory of Flight Department.

With the installation of the twelve weeks' course in June and July, 1918 the work in the Airplanes Department was practically unchanged, but more emphasis being in the whole service in laboratory work in Rigging and Repair, was for a while put a very heavy load on the Airplanes Department due to the overflowing of the schools. It was important that what was done of this nature was thoroughly carried out to the students of the Cadet School with, just preceding their graduation, a practical test for the instructors determining the qualification of the graduation of one hundred and fifty-two men.

The outline of the work of the Airplanes Department in May, 1918, under the twelve weeks' curriculum was as follows:

Subjects	Hours
Theory of Flight	6 - Lewis
Meteorology	3 - Jeffers
Tactics	20 - Duff
Repair of Machines	12 - Smith
Instruments	4 - Jeffers
Types of Machines	2 - Erickson
Final Examination (with week)	2 -

The work in Rigging included both lectures and laboratory work and was divided as follows:

Subjects	Section	Hours
Introduction	A	1 - Lewis
Assembly (Depth section)	A	1 - Bonsteel
Momentarute	B	1 - Lewis
Landing gear (1 ½ hour lecture)	B	2 - Erickson
Elementary treatment of structure	B	1 - Woodruff
Center section (1 ½ hour lecture)	C	2 - Erickson
Inspection and measurements		
Assembly drawings	C	1 - Lewis
Materials, woods and metals	C	1 - Woodruff
Wires and fittings	C	1 -
Fabrics and dopes	C	1 - Bradbeer
Dihedral angle, lecture		1 - Ball
Dihedral angle, alignment		3 - Laboratory
Stabilizers and controls, lecture		1 - Ball
Stabilizers and controls, alignment		3 - Laboratory

Instruction-Airplanes

	Squadron	Hours
Functions of parts of airplane	E	1 - Ball
Checking alignment of airplane	E	1 - Laboratory
Effect of faults in rigging	F	1 - Erickson
Semi-final examination	F	1 -
Propeller manufacture and theory	G	1 - Woodruff
Review of all work in the department	I	1 - Ball

Repair of Machines included:

Inspection of airplanes	G	1 - Woodruff
Inspection of airplanes	G	1 - Laboratory
Kinds of terminal splices	G	1 - Ball
Splicing and soldering	H	4 - Wells & Lab.
Care of machines	I	1 - Erickson
Wing covering, lecture	I	1 - Ball
Wing patching, laboratory	K	2 - Laboratory
Mending longerons, lecture	L	1 - Woodruff

The only important change in the revised curriculum of October 14, 1918, was the institution of Penguin instruction. A field was obtained fairly close to the University, a building erected for housing the penguins when received and a number of them set up. Due to the signing of the armistice the course was shortened from twelve to ten weeks thereby eliminating Penguin instruction before any squadrons in the new curriculum had reached this part of the work.

g. Instruction - Airplane Principles: Lectures on Airplane principles have been given by the instructors of the Airplanes Department since the opening of of the School although for a few months the lectures were included in the Aids to Flight Department. Until the institution of the October 14, 1918 curriculum, these lectures went under the name of Theory of Flight, at that time the name being changed to Airplane Principles. The time devoted to these lectures amounted to six hours during the twelve weeks' curriculum. A copy of the syllabus furnished to cadets on this subject is included in Appendix K4, this syllabus showing briefly the subject matter covered.

h. Instruction-Nomenclature: Two hours on Nomenclature of Airplanes have been included in the curriculum of the Airplanes Department. Under the twelve weeks' curriculum, Nomenclature did not appear as a separate topic, but the time for this work was taken from the hours scheduled for Rigging. Pamphlets issued by the War Department were used as the basis for this course. A stripped fuselage and wings with all parts tagged was kept in the Rigging Laboratory so that cadets could come in at any time and study. A list of "Aeronautical Terms" furnished to each cadet is included in Appendix K4, also a sketch showing three views of an airplane on copies of which all cadets were required to fill in the names of the various parts.

i. Instruction-Rigging: It is believed that the character of the work given in Rigging will be very clearly shown by the "Instructors' Notes" on Rigging prepared by the instructors in the Airplanes Department for the use of instructors in conduct-

The only important change in the revised curriculum of October 14, 1918, in the new curriculum had reduced this part of the work.

E. Instruction - Airplane Principles: Lectures on Airplane principles lectures went under the name of Theory of Flight, at that time the name being changed to Airplane Principles. The time devoted to these lectures amounted to hours during the twelve weeks' curriculum. A copy of the syllabus furnished to on this subject is included in Appendix K4. matter covered.

F. Instruction-Nomenclature: Two hours on Nomenclature of Airplanes have work was taken from the hours scheduled for Rigging. Pamphlets issued by the War with all parts tagged was kept in the Rigging Laboratory so that cadets could come ties of which all cadets were required to fill in the names of the various parts.

G. Instruction-Rigging: It is believed that the character of the work given the instructors in the Airplanes Department for the use of instructors in conduct-

the work in Rigging, included in Appendix K4 . These notes include a list of tools used for the various parts of the work, the tools being made up in sets in the tool room and issued to the corporal of each squad at work on a machine. The notes also include a distribution of time for the different adjustments. It was deemed necessary to follow some such definite time schedule in carrying out the work in Rigging in order that all essential parts of the work would be covered in the time allotted. The squadron letters referred to in the following notes are based on the arrangement of work in the curriculum of April 1, 1918. The revised curriculum of October 14, 1918, covered practically the same work as indicated in "Rigging Notes", but the allotment of time by weeks was different, as the work was covered in five weeks under the last schedule whereas it was spread over eleven weeks in the curriculum of April 1, 1918.

These notes in Rigging served to standardize the work in Rigging which was very necessary inasmuch as with some of the larger squadrons as many as six instructors were busy in Rigging at the same hour. The attempt has always been made to have not over six or eight cadets to a ship, each ship in charge of an instructor. In order to run the Rigging laboratory and equipment at as high a load factor as possible, the squadrons doing Rigging have always been split in two sections. This was also necessary in order to cut down the number of cadets required to work on each ship at a time. Sections were so rotated that the cadets completely aligned a ship in about four weeks, while the ships themselves were aligned and disassembled twice each week. For examble, if squadrons A, B, C, D and E are doing the disassembly and assembly work in Rigging, the first section of the above named squadrons would completely assemble, inspect and disassemble the ship from Monday to Wednesday inclusive, and the second section of the above named squadrons would go through the same operation in the latter half of the week.

AppendixK4 also includes a copy of the syllabi covering the Rigging lectures on Stresses, Woods and Metals, Wires and Fittings and Fabrics and Dopes. This syllabus is in more or less skeleton form and was furnished to each cadet as a help in taking proper notes on the above subjects.

Under the eight weeks' curriculum cadets were required to go through the various steps of assembling and properly aligning a ship, each ship being put through this process twice each week. It was necessary at that time to pay two assistants for disassembling the ship twice a week, but upon the institution of the twelve weeks' curriculum the disassembling was done by the cadets in A Squadron as part of their work in nomenclature, thereby eliminating the two paid assistants who had been doing this work under the eight weeks' course.

A part of the work in Rigging which also counted as a part of the semi-final examination was the airplane inspection sheet which each cadet was required to fill out. Copies of these sheets were received in November, 1917, and this inspection has been a regular part of the Rigging work since that time. A sample of this inspection sheet is shown on the following page.

A plan which was found helpful in standardizing the work of instructors in Rigging and also checking the thoroughness of their work was the inspection of in-

[illegible] Appendix IV. These notes include a list of tools [illegible] for the work, the tools being made up in sets in the tool [illegible] proportion of each squad at work on a machine. The notes also [illegible] for the different assignments. It was deemed necessary [illegible] time available in carrying out the work in Rigging [illegible] essential parts of the work would be covered in the time allotted. [illegible] referred to in the following notes are based on the arrangement [illegible] April 1, 1918. The notes [illegible] but the [illegible] weeks work [illegible] time.

[illegible] Rigging served to standardize the work in Rigging which was [illegible] as with some of the larger squadrons as many as six instructors [illegible] or eight cadets to a ship, each ship in charge of an instructor. In order to [illegible] Rigging laboratory and equipment at as high a load factor as possible, the [illegible] were so rotated that the cadets completely aligned a ship in about four weeks, [illegible] section of the above named squadrons would completely assemble, inspect and [illegible] the ship from [illegible] section of the above named squadrons would go through the same operation in the latter half of the work.

[illegible] Wires and fittings and fabrics and ropes. This syllabus [illegible] more or less skeleton form and was furnished to each cadet as a help in taking [illegible] notes on the above subjects.

Under the eight weeks' curriculum cadets were required to go through the [illegible] steps of assembling and properly aligning a ship, each ship being put through [illegible] process twice each week. It was necessary at that time to pay two assistants [illegible] disassembling the ship twice a week, but upon the institution of the twelve weeks' [illegible] curriculum the disassembling was done by the cadets in A Squadron as part of their [illegible] in nonscholastime, thereby eliminating the two paid assistants who had been doing [illegible] work under the eight weeks' course.

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WEEKLY AIRPLANE INSPECTION CARD

Airplane { School No. ..... Maker's No. .....
Make ..... Model .....

DATE ....., 191.....

Engine: Make ..... No. ..... Model .....

NOTE.—This card must be made out by Field Inspectors of every machine under his charge, signed by him, and must be turned over to the Chief Inspector as soon as made out.

Propeller:

Condition of blades .....

Hub assembly (bolts, washers, cotters) .....

Security of shaft .....

Gasoline System:

Tank .....

Gasoline leads and connections .....

Pump .....

Gasoline in tank .....full.

Water System:

Leakage .....

Radiator full .....

Engine:

Valves—

Intake clearance .....

Exhaust clearance .....

Spark Plugs—

Clean .....

Gap .....

Carburetor—

Security to manifold .....

Bracing .....

Manifold joints .....

Oil System:

Leakage and amount of oil .....

Magneto:

Mounting .....

Distributor board .....

Breaker point clearance .....

Transmission wear .....

Throttle Control:

Pulleys .....

Wiring .....

Landing Gear

Wire tension .....

Wire terminals .....

Struts and fittings .....

Security of wheels and axle .....

Shock absorber rubbers .....

Tire inflation .....

Alignment .....

Fuselage Nose:

Tension fuselage bracing .....

Tension and terminals wing drag bracing .....

Engine bed or bolts .....

Wing Fittings:

Right wing { Upper .....
Lower .....

Left wing { Upper .....
Lower .....

Center section .....

Wing Wire: (tension, defects, terminals, clevis pins, turnbuckles)

Flying wires { Right wing .....
Left wing .....

Landing wires { Right wing .....
Left wing .....

Stagger and Incidence wires { Right wing .....
Left wing .....

Center section .....

Notes:

[OVER]

Struts: (straightness, sockets, bolts, ferrules)

Right wing .....

Left wing .....

Center section .....

Wing Fabric and Frame: (tears, tension, finish, breaks)

Right wing { Upper ..... / Lower .....

Left wing { Upper ..... / Lower .....

Center section .....

Wing Alignment:

Dihedral angle .....

Straightness .....

Droop .....

Stagger .....

Ailerons:

Hinge security { Right ..... / Left .....

Control wire connection (horn, safety loop) { Right ..... / Left .....

Frayed control wire (inside fuselage)

(Pulleys and guides) { Left ..... / Right .....

NOTE.—Control wires frayed at any point of their length must be replaced at once.

Pulleys (security, free running) { Right ..... / Left .....

Adjustments .....

Fabric, frame (alignment, straightness)

Right ailerons { Upper ..... / Lower .....

Left ailerons { Lower ..... / Upper .....

Fuselage Rear Interior:

Wire tensions .....

Frame .....

Fittings .....

Alignment .....

Fabric .....

Rudder:

Fabric and frame .....

Hinge security .....

Control wire connection (horn) .....

Footbar .....

Frayed wire .....

NOTE.—Control wires frayed at any point of their length must be replaced at once.

Adjustment .....

Pulleys (security, free running) .....

Stabilizer: (bolts, nuts, braces, fabric, frame, alignment)

.....

Vertical Fin: (bolts, nuts, fabric, frame, alignment)

.....

Elevators:

Hinge security .....

Fabric, frame { Right ..... / Left .....

Control wire connections—

Horn { Right ..... / Left .....

Post .....

Frayed control wire .....

NOTE.—Control wires frayed at any point of their length must be replaced at once.

Adjustment .....

Pulleys (security, free running) .....

Post connections, hinge .....

Tail Skid:

Skid .....

Fittings .....

Shock absorber .....

Safety loop .....

FIELD INSPECTOR:

2m-6,'18

structors' work in Rigging carried out by one of the instructors best qualified to make this inspection. In this inspection errors in Rigging and alignment and minor repairs necessary were noted. Results of the inspection were posted on the bulletin board of the department and quite an improvement in the accuracy of instructors' work was noted after the institution of this plan.

In May, 1918, during the Rigging work on the Curtiss JN-4D, SC No. 39868, a running splice failed under a light load. The character of the failure was such as to indicate a splice purposely made defective. The return part of the lap was about one quarter of its proper length and the remaining space was filled up with loose bent wires. The ferrule was then made up of wire wrapped in the ordinary manner and then soldered. This fact was reported immediately to the Inspection Department in San Francisco as well as to the Director of Military Aeronautics.

j. Instruction-Repair of Machines: In the Repair laboratory the time was devoted to wing covering, patching and splicing. This work might be described briefly as follows:

For the laboratory work in wing covering and patching the following course was worked out. Small wooden frames 15" square were prepared, also cotton or linen bags open at one end. The cadet was required to cover the frame, sew up the end and apply one coat of dope to the fabric. He then sewed the fabric to a rib down the center of the frame and doped on a rib strip. More dope was applied and the fabric varnished. Having completed the frame, the cadet made three patches on it, using linen. The first patch was made on a round hole, the second on a triangular tear and the third on a tear across the rib which involved lifting and replacing the rib strip. A copy of a brief syllabus on Wing Patching furnished to cadets is included in Appendix K4.

For the work in soldering and splicing it was found necessary to give the cadets elementary work in soldering as many of them had never handled a soldering iron. A series of exercises were evolved such as tinning an iron, soldering a small hole, soldering two pieces of metal together and finally the making and soldering of a running splice. The laboratory in which the above work was carried out is shown on pages 192 and 193.

As an indication of the equipment used in the Repair Laboratory in wing patching, doping, soldering, etc, the following estimate of the cost of material required for this laboratory when its installation was contemplated is given. Slight changes were made in the quantities and costs, but the list below is approximately accurate.

"The cost of equipment and material for the new Splicing Laboratory is given below and is based on quotations obtained from the Purchasing Department of the University:"

[illegible] carried out by one of the instructors best qualified to [illegible] instruction. In this inspection errors in rigging and alignment and minor repairs necessary were noted. Certain of the [illegible] were [illegible] with the result of the instructor had made an improvement in the accuracy of instructors' work by [illegible] instruction of this plan.

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4. Instructional-Laboratory: In the Repair Laboratory the time was devoted to wing covering, painting and soldering. This work plant is described briefly as follows:

For the laboratory work in wing covering and painting the following course was worked out. Small wooden frames 24 inches wide were provided, also cotton or linen bags open at one end. The cadet was required to cover the frame, sew up the end and apply one coat of dope to the fabric. He then sewed the fabric to a rib down the center of the frame and doped on a rib strip. More dope was applied and the fabric varnished. Having completed the frame, the cadet made three patches on it, using linen. The first patch was made on a round hole, the second on a triangular tear and the third on a tear across the rib which involved lifting and replacing the rib strip. A copy of a brief syllabus on Wing Patching furnished to cadets is included in Appendix VA.

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"The cost of equipment and material for the new Splicing Laboratory is given below and is based on quotations obtained from the Purchasing Department of the University."

Instruction-Airplanes

48	3" vises @ $3.00	$144.00
50	2# soldering coppers @ $.56#	56.00
50	Soldering Copper handles $.40 doz.	1.60
48	6" Rd. Nose Pliers $6.25 doz.	25.00
48	Tinners' snips $.96 pair	46.08
48	Ball pein hammers 5/8# $7.76 doz.	31.04
12	12" Carews wire cutters $3.35 each	40.20
48	12" wood scales	9.60
48	Pocket scribers @ $.35	16.80
48	Flat bastard files 10" Nicholson @ $7.00 doz. less 55%	12.60
60	File handles 4¼" long hardwood @ $.50 doz.	2.50
12	Gas ovens - 2 burner @ $3.60	43.20
72	2" cinch Varnish brushes	13.44
60	Tin cups	2.60
50	lbs. sheet zinc B & S @ $.24 lb.	12.00
100	lbs. wire solder	48.50
50	lbs. #8 Aviator wire @ $.54 f.o.b. Trenton, N.J.	27.00
25	lbs. Sal Ammoniac @$.24	6.00
6	Gal. HCL @ $.75 bottle 6#	6.75
100	yds. linen @ $1.00 yd	100.00
100	Gal. dope @ $2.00	200.00
5	Gal. Acctone @ $2.50	12.50
	Containers for acid, wire bending machine, 12 work benches, 12 tool boxes, 1 wash trough and 9 faucets, towel and soap holders	400.00
		1237.41

The institution of the equipment for the Splicing Laboratory was not completed until the early part of June 1918 although the room was in use for Wing Patching in the latter part of May.

In July, 1918, samples of the work done in soldering, splicing, doping and patching were sent to Washington in accordance with directions issued in Bulletin No. 273. Practical work in longeron repair and wood splicing was not given, demonstrations only being given in this part of the work by the instructor.

k. Instruction-Meteorology and Instruments: In the twelve weeks' curriculum of April 1, 1918, three lectures on Meteorology and four lectures on Instruments were included in the Airplanes Department. The curriculum of October 14, 1918 transferred the Meteorology lectures and the lectures on the Compass to the Observation Department, leaving two hours lectures on Instruments in the Airplanes Department. The lectures on these subjects were based on stencils, pamphlets, etc., furnished by the War Department, together with samples of compasses, altitude indicators and other instruments furnished to the School. The material covered in the lectures on Meteorology and Instruments is clearly shown in the syllabi on these two subjects included in appendix K4 . Copies of these syllabi were furnished to cadets.

Instruction-Library

40	12" files @ $3.00	$144.00
60	32" motorcycle goggles @ [illegible]	56.00
30	Motorcycle repair manuals @ .40 doz.	1.60
40	8" Ta. lead pliers @ [illegible]	[illegible]
40	Plumber's drips @ .96 pair	[illegible]
60	Wall pole hooks @ [illegible] doz.	[illegible]
12	12" Chrome wire cutters @ $3.35 each	40.20
40	12" wood scales	9.60
[illegible]	Pocket knives @ [illegible]	[illegible]
[illegible]	Free Station files for libraries @ [illegible]	[illegible]
60	File handles 4½" long hardwood @ $.50 doz.	2.50
12	Gas ovens - 2 burner @ $3.60	43.20
72	2" clinch Varnish brushes	13.44
30	Tin cups	2.60
20	lbs. sheet zinc @ [illegible] lb.	[illegible]
100	lbs. wire solder	48.50
50	lbs. #8 Aviator wire @ $.54 f.o.b. Trenton, N.J.	27.00
25	lbs. Sal Ammonic @ $.24	6.00
6	Gal. HCl @ $.75 bottle 6#	6.75
100	yds. linen @ $1.00 yd	100.00
100	Gal. dope @ $2.00	200.00
5	Gal. Acetone @ $2.50	12.50
	Containers for acid, wire bending machine, 12 work benches, 12 tool boxes, 1 wash trough and 9 faucets, towel and soap holders	
		400.00

Instruction

The institution of the equipment for the Splicing Laboratory was not completed until the early part of June this allowing the room was in use for the training pertaining in the latter part of May.

In July, 1918, another of the work came in relaying, splicing, drilling and testing was sent to Washington in accordance with directions received from Bulletin No. 271. Training work in Longwood Park was then splicing was not given, demonstrations only being given in this part of the work by the instructor.

c. Instruction-Laboratory and Instruments. In the Navy yard, Washington, D.C., 1918, there were between 40 and 50 men between 21 and 35 attached to the Electrical Department. The particulars of training, instructions and instruments received were the lectures on the Compass to the Department Department, working for Naval Lectures on Instruments in the Electrical Department. The lectures on their application were based on circuits, currents, etc., relations of the Non-Magnetic, Compass with magnetic to compasses, altitude indicators and other instruments furnished to the School. The material covered in the lectures on Telegraphy and instruments is clearly seen in the syllabi on these subjects included in appendix II. Copies of these syllabi were furnished in duplicate.

Instruction-Airplanes

1. Instruction-Special Points: In May, 1918, a plan was adopted of setting aside one hour in L squadron for a review of all the work of the department, seven instructors giving lecture courses were present and the cadets were broken up into groups to ask questions. While intended to benefit the cadets it was found that it was exceedingly good for the instructors, as it forced them to a renewed interest not only in their own course but in the other courses given in the department.

In September, 1918, the plan was tried out by the Airplanes Department of setting aside one hour in C squadron for an oral examination. Cadets were divided into groups of six or eight, each group being in charge of an instructor. Numerous questions on the work covered up to that point were asked by the instructors and this scheme has proved very beneficial in determining the points on which cadets were weakest.

In June, 1918, authority was received to send four of the instructors in the Airplanes Department to the flying field in Sacramento for a visit of not over three days. In accordance with this authorization four of the airplane instructors visited Mather Field and the following taken from the report of the Head of the Department for the month of July, 1918, gives briefly the conclusions of these men regarding their trip:

"The results of the visit of four instructors to Mather Field have been most interesting. C. B. Bradbeer and C. J. Erickson spent July 14-17 and G. F. Wells and H. C. Woodruff July 19-22 on the field. While there, they were treated to all the stunts known and allowed to pilot the ship for a short time. They were also given every opportunity to see and compare the work at Mather Field with what is taught here. Their conclusions where as follows:

> From our visit we would say that routine inspections should be stressed more at this School and also that the Cadets be told how the flying field is divided up, and what rules are followed at the field. The "T", flags, dead space, dead stick, etc., should be explained so the cadet will know something as to the lay out of the field before he actually flies.
>
> The only criticism that we heard of our School was that we were too long on theory and short on practical work. This is perhaps not a just criticism, as our work is meant to be mainly theoretical in preparation for the actual flying practice received at the flying schools.
>
> That what practical work we do is well done, is attested by the fact that the cadets were put to work rigging machines for about a week after arrival; and as far as we could ascertain did good work with the exception of locking nuts and pins. This carelessness was probably due to lack of practice in this detail in the laboratory.
>
> Taken as a whole the schools seem to dovetail nicely, and the

Instructor's Conference.

a. Instructor's Conference: In May, 1918, a plan was adopted of [illegible] a review of all the work of the department, where instructors from other schools were present and the cadets were [illegible] practice. While intended to benefit the cadets it was found that it was exceedingly good for the instructors, as it forced them to become interested not only in their own course but in the other courses given in the department.

In September, 1918, the plan was tried out by the Airplanes Department of [illegible] in 6 squadrons for an equal [illegible]. Cadets were divided into groups of six or eight, each group being in charge of an instructor. Numerous [illegible] were [illegible] at that point were added by the instructors and the [illegible] [illegible] the cadets in demonstrating the ability to make reports more [illegible].

In June, 1918, authority was received to send four of the instructors in the Airplanes Department on a long cross-country flight, or a flight of not less than [illegible] miles. In connection with this authorization the Chief of the Airplane Department [illegible] the following issue from the report of the head of the [illegible] for the month of July, 1918, gives briefly the conclusions of these men [illegible] their trip:

"The results of the visit of four instructors to Mather Field have been [illegible]. [illegible] Department [illegible] U. S. Marines [illegible] U. S. [illegible] Cadets only [illegible] in the flying. Cadets [illegible] are [illegible] in all the flying [illegible] allowed to pilot the ship for a short time. They [illegible] given every opportunity to see the [illegible] Department [illegible] what is taught here. Their conclusions where as follows:

> From our visit we would say that routine inspections should be stressed more at this School and also that the Cadets be told how the flying field is divided up, and what rules are followed at the field. The "T", flags, dead space, dead stick, etc., should be explained so the cadet will know something as to the lay out of the field before he actually flies.
>
> The only criticism that we heard of our School was that we were too long on theory and short on practical work. This is perhaps not a just criticism, as our work is meant to be mainly theoretical in preparation for the actual flying practice received at the flying schools.
>
> That what practical work we do is well done, is attested by the fact that the cadets were put to work rigging machines for about a week after arrival; and as far as we could ascertain did good work with the exception of locking nuts and pins. This carelessness was probably due to lack of practice in this detail in the [illegible].
>
> Taken as a whole the schools seem to dovetail nicely, and the

> few small differences noted will be rapidly eliminated by the series of intervisitations just started, and of which our visit is a part."

Previous to these visits the head of the department and another instructor had spent about a week at Rockwell Field, one in the fall of 1917 and the other in the early part of 1918. The purpose of all these visits was to connect up the work done in the flying and ground school and to discover and eliminate as many differences as possible.

m. Instruction-Examinations: Weekly and final examinations in the Airplanes Department were always given as scheduled in the curricula. On account of the various allied topics included in this Department proper distribution of questions between the various subjects covered was important and this point was well handled by the "Examining Board" of the Airplanes Department.

Sample sets of final examination questions covering different periods of the School are furnished on the following pages.

A I R P L A N E S

Squadron F-40 Final Examination. April 11, 1918.

1. After aligning the center section by the level and plumb-bob method, it is found that an error in leveling was made, the tail being low. What effect will this have on the alignment of the center section?

2. (a) How is a wing drooped or given a wash-in?
   (b) Why is it drooped?

3. Name the important steps in the alignment of the landing gear by cross-distance method.

4. Draw three sketches showing the control wiring of (a) elecators, (b) ailerons, (c) rudders.

5. Name the various steps necessary in patching a bullet hole in a wing.

6. Distinguish between pitch and pitch angle as applied to several sections of the same propeller.

7. If you were able to inspect spruce from the time it was cut until it was used for struts and beams in an airplane, name the particular things you would cover in your inspection.

8. (a) Name the four most important requirements that a speed scout must satisfy.
   (b) Name the two other requirements that a reconnaissance type must satisfy.

9. (a) What should be done to the propeller before leaving the airplane for the night?
   (b) Name the defects in the wheels that you should look for after a bad landing.

10. Using the sketch provided, mark on it:
    1. Stagger. 2. Elevators. 3. Horizontal stabilizer. 4. Left Aileron.
    5. Stagger & incidence wires. 6. Overhang. 7. Gap. 8. Span.
    9. Center section. 10. Riggers' dihedral angle.

[illegible]

Section P-11 Final Examination April 11, [illegible]

1. After aligning the center section by the level and plumb-bob method, it is found that an error in lateral was made, the tail [illegible] low. What will this have on the alignment of the center section?

2. (a) What is a [illegible] and [illegible]
(b) What is it [illegible]?

3. Take the [illegible] shown in the diagrams at the [illegible] and [illegible] method.

4. Draw three sketches showing the control wiring of (a) elevators, (b) ailerons, (c) rudders.

5. Name the various steps necessary in patching a bullet hole in a wing.

6. Distinguish between pitch and pitch angle as applied to several sections of the same propeller.

7. If you were able to inspect spruce from the time it was cut until it was used for stock and back in the [illegible], name the particular [illegible] you would cover in your inspection.

8. (a) What is the most important requirement that a good [illegible] must satisfy?
(b) What is the [illegible] requirement that a [illegible] must satisfy?

9. (a) What should be done to the propeller before leaving the airplane for the night?
(b) Name the defects in the wheels that you should look for after a bad landing.

10. Using the sketch provided, mark on it:
1. Stagger. 2. Elevators. 3. Horizontal stabilizer. 4. Left Aileron.
5. Stagger & incidence wires. 6. Overhang. 7. Gap. 8. Span.
9. Center section. 10. Riggers' dihedral angle.

AIRPLANES. SQUADRON L-51

July 23, 1918.

1. (a) Why are not the wings of an airplane placed much closer together than you ordinarily find them?
   (b) Why not much farther apart?

2. (a) Show by a diagram the Terrestrial wind system, and briefly explain it's importance.
   (b) Explain the general ideas involved in the forecasting of the weather.

3. (a) Show the two ways in which error due to variation is eliminated from the magnetic course.
   (b) What is the purpose of the liquid in the compass bowl?

4. In the alignment of the wings of an airplane describe:-
   (a) How you tell when the wing beams are straight.
   (b) How you tell when they are parallel.

5. (a) Name the important points in the alignment of the ailerons.
   (b) Draw a sketch showing the elevator control wires plainly indicating hinges and pivots.

6. (a) Why is wood a good compression member?
   (b) How is longitudinal shear guarded against in wooden members?

7. (a) Why is a propeller spoken of as absorbing a certain amount of horse power?
   (b) What tests would you make on a propeller mounted on an airplane to determine its fitness for use?

8. Sketch each kind of splice used on airplanes, labeling each and also stating the kind of wire each of these splices is found on.

9. Give the different points to be observed while aligning the fuselage.

10. (a) What should be done to a propeller before leaving the airplane for the night?
    (b) Name the important points in the care of the landing gear.

Note: Hand in this sheet inside of your examination paper.

AEROPLANES. QUESTION L-41

June 24, 1919.

1. (a) Why are not the wings of an airplane placed much closer together than you ordinarily find them?
(b) Why not much farther apart?

2. (a) Name 5 things the horizontal wind exerts, and briefly explain its importance.
(b) Describe the general lines involved in the forecasting of the weather.

3. (a) Name the two ways in which error due to variation is eliminated from the magnetic bowls.
(b) What is the purpose of the liquid in the compass bowl?

4. In the alignment of the wings of an airplane describe:-
(a) How you tell when the wing beams are straight.
(b) How you tell when they are parallel.

5. (a) Name the important points in the alignment of the ailerons.
(b) Draw a sketch showing the elevator control wires plainly indicating aligned and elevate.

6. (a) Why is wood a good compression member?
(b) How is longitudinal shear guarded against in wooden members?

7. (a) Why is a propeller spoken of as absorbing a certain amount of horse power?
(b) What tests would you make on a propeller mounted on an airplane to determine its fitness for use?

8. Sketch each kind of splice used on airplanes, labeling each and also stating the kind of wire each of these splices is found on.

9. Give the different points to be observed while aligning the fuselage.

10. (a) What should be done to a propeller before leaving the airplane for the night?
(b) Name the important points in the care of the landing gear.

Note: Hand in this sheet inside of your examination paper.

AIRPLANES DEPARTMENT.
Final Examination.

Squadron L-60. Oct. 1, 1918.

1. What means are used to maintain directional stability in an airplane? Explain the way in which one method works.

2. (a) Explain why certain types of air speed indicators are stall indicators also.
(b) How would it be possible to get ground speed from an air speed indicator?

3. (a) Explain the principles involved in weather forecasting.
(b) Name some general facts concerning the regular winds above the earth's surface.

4. In an airplane how would you tell if -
(a) the front lower wing beams were straight?
(b) the wing had a droop?
(c) the right and left wings had the same dihedral?
(d) the wings had a 14" stagger?

5. Tell briefly the proper position of the vertical fin and how you would align it in any one type of airplane found in our laboratory.

6. (a) In any part of the airplane receiving compression only, how is that stress distributed through the member?
(b) In any part of the airplane that becomes bent, how does the kind and amount of stress received vary through the material?
(c) What main result is obtained by channeling out wooden members? (Disregard the fact that the member is made lighter).

7. (a) State two general rules for distinguishing allied ships from German ships.
(b) What two main advantages has a biplane over a monoplane of the same wing area?
(c) What main advantage has the single motor pusher type over the single motor tractor type?
(d) What are the two main requirements of a bombing machine?

8. (a) What things cause the principal straing on a fuselage during flight?
(b) How is it braced to meet these strains?
(c) What is a monocoque girder fuselage?
(d) What advantages has it over the girder type?

9. (a) Name two methods of making a welded joint.
(b) In making a splice in an extra flexible cable
1. Name the splice used, 2. Describe its construction, 3. Is it ever soldered? Why?

10. Name the liquids used on a wing covering:-
(a) To soften the varnish before it is scraped.
(b) To thin down the dope in case it gets too heavy.
(c) To promote the drying of the dope in cold and damp weather.

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11. ENGINES DEPARTMENT.

a. General. Instruction in the Engines Department has covered theoretical and practical work in airplane engines, including lectures on principles, carburetors, magnetos and types of engines, and practical work in disassembly, assembly and engine running. The work in the department has increased greatly since the beginning of the School. Originally the instruction in this department consisted of about thirty-five hours, while under the latest curriculum this was increased to nearly seventy hours.

In the original curriculum of June 11, 1917, the work in the Engines Department began in D week with the final examination in H week, making a five weeks course. In the revision of the curriculum of November 1, 1917, the work in engines was covered in three weeks, beginning in D week and ending in F week.

In the twelve weeks course of March and April 1918, the course in engines was extended over a period of eleven weeks, beginning in B week, the final examination occurring in M week. The twelve weeks course greatly increased the number of hours practical work in engines on account of the fact that it was necessary to give at the ground schools a large part of the practical work which had heretofore been given at the flying schools.

Under the last curriculum of October 14, 1918, the work in engines was increased to sixty-nine hours for Pilots, Bombers and Observers, however, taking only ten hours work in engines. The instruction in engines began in D week in the last curriculum and extended through K week, making a seven weeks course for Pilots, while Bombers and Observers completed their work in engines in D week.

b. Staff. When work started in the Engines Department in the fourth week after the opening of the School, the work in the Engines Department was under the direct supervision of Professor B. F. Raber. Professor Raber is Assistant Professor of Mechanical Engineering at the University of California and was a member of the Committee to Toronto from this University. With the opening of the regular University work in the Fall of 1917, Professor Raber continued to serve the School of Military Aeronautics in an advisory capacity only, Mr. D. J. Conant, (later commissioned Second Lieutenant A. S. S. C.), being appointed Head of the Department. Lieut. Conant is a mechanical engineer of exceptional ability, and the excellent development and organization of the Engines Department have been due largely to his efforts.

The work in the Engines Department has been fairly technical, and it has been necessary to secure men for this work who were exceptionally well qualified. It has been possible to obtain men well versed in gas engine theory and with practical automobile engine experience who were able quickly to absorb information available regarding the airplane type of motors. Because of the higher class of work in this department it has been necessary to maintain a slightly higher salary scale in

the Engines Department than in some of the other departments.

The work in the department has been well organized, particularly during the period of maximum size of the school, the work being properly divided among the members of an exceptionally strong staff. The lecturers in this department have been carefully selected. Other members of the staff have been appointed to cover such work as preparation of examination questions, grading the papers, scheduling the work so as to obtain a proper division between the various members of the staff, etc.

Appendix I-1 contains a complete list of the instructors who have served at various times in the Engines Department. The following points of interest summarized from this appendix might be noted: Of a total of 29 instructors who have served in this department, 19 served their entire period as civilians, 14 were university graduates, and eight had had previous engineering training. The maximum number on duty in this department at any one time was 19.

c. Curriculum. In discussing the curriculum requirements, the curricula of the following dates only will be mentioned, these being the principal curricula under which the School operated.

Curriculum of June 11, 1917.
Curriculum of November 1, 1917.
Curriculum of April 1, 1918.
Curriculum of October 14, 1918.

The following table shows the number of hours devoted to the various sub-heads in the Engines Department in the different curricula under which the School has operated:

Table No. 14.
CURRICULUM REQUIREMENTS - ENGINES DEPARTMENT.

	Total Hours Required in Curriculum of		
	6/11/17	9/26/17	11/1/17
ENGINES			
Stationery Engines	26		
Rotary Engines	8		
Magneto Theory	1		
ENGINES			
Principles of Internal Combustion Engines, Caburetion, Ignition		8	8
Laboratory Work		28	25
Care of engines and tools		2	2
Types of engines		1	1
Trouble Shooting		1	1
Examination		2	2

	Total Hours Required in Curriculum of				
	3/1/18	4/1/18	10/14/18		
			Pilots	Bombers	Observers
ENGINES					
Principles	8	9			
Laboratory	42	46			
Care of Engines	2	-			
Types of Engines	1	2			
Examination	2	2			
ENGINES					
Principles			12	4	4
Types			4	-	-
Shopwork			35	5	5
EngineRunning			18	-	-
Examination			3	1	1

The work in the Engines Department has always been divided between lectures covering the principles or theory of operation and laboratory work designed to give some familiarity with the mechanical operation of the airplane engine. For instance, the curriculum of November 1, 1917, provided eight lectures on the principles of internal combustion engines, carburetion and ignition, twenty-five hours laboratory work, two hours lecture on care of engines and tools, one hour lecture on types of engines and one hour trouble shooting.

This general division of the work has been maintained throughout all the curricula, the later twelve weeks courses providing, however, for increased amounts of laboratory work. The curriculum of April 1, 1918, called for nine hours lecture on principles, and forty-six hours laboratory work, which included disassembly and assembly work, laboratory work on carburetors and magnetos, and eight hours on engine running. The requirements under this curriculum are shown in detail in Appendix F5.

In the curriculum of October 14th, 1918, the work in engines was again increased, twelve lectures on principles being called for, four hours on types of engines, thirty-two hours laboratory work covering disassembly, assembly, etc., and eighteen hours on engine running.

Inasmuch as the work in the Engines Department under the last curriculum was concluded in the tenth week, the signing of the armistice and the shortening of the course to ten weeks did not affect the work in this department. It might be stated at this point, however, that it has not proved satisfactory to have ten hours work in engine running coming in the tenth week, when the final examination in engines occurred in the ninth week. It is believed that this work should come prior to the examination.

d. Laboratory Space. The laboratory work in engines was originally all given in Room 13, Aeronautics Laboratory. This room contained stands for mounting engines, space being provided for mounting eight engines. Later, the room was partitioned off, each engine being enclosed in a small stall capable of

[illegible] hours required in curriculum of [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

for instance, the curriculum of November 1, 1917, provided eight lectures on the principles of internal combustion engines, carburetors and ignition, twenty-five hours laboratory work, two hours lecture on care of engines and tools, one hour lecture on types of engines and one hour trouble shooting.

This general division of the work has been maintained throughout all the curricula, with later minor changes.

amounts of laboratory work. The curriculum of April 1, 1918, called for nine hours lecture on principles, [illegible] eight hours on engine running. The requirements under this curriculum are shown in detail in Appendix F5.

In the curriculum of October 14th, 1918, the work in engines was again [illegible] and eighteen hours on engine running.

Inasmuch as the work in the Engines Department under the last curriculum of [illegible] course to ten weeks did not affect the work in this department. It might be stated at this point, however, that it has not proved satisfactory to have ten hours work in engine running coming in the tenth week, when the final examination in engines occurred in the ninth week. It is believed that this work should come prior to the examination.

4. Laboratory Space. The laboratory work in engines was originally [illegible] laboratory. This room contained [illegible] engines, space being provided for mounting such engines. Later, the room was partitioned off, each engine being mounted in a small start [illegible]

holding an instructor and eight or ten cadets.

Upon the completion of the first addition to the Aeronautics Laboratory in November, 1917, the Engines Department was assigned Room 1 in this building. Special engines, of which the school had only one of each type available, were mounted in this room, while the Curtiss and Hall-Scott engines were mounted in the stalls in Room 13. Soon after this the miniature range in Room 14 was removed and this room was assigned to the Engines Department, being taken by them in exchange for Room 1, which was turned over to Gunnery.

In May, 1918, Building #4 was completed, known as the Engine Test Building, its general location being shown in the picture on Page 286. This building contained nine stalls, eight of which contained stands for mounting engines for disassembly and assembly work, the ninth being used for a machine shop. This building also contained nine stands for mounting engines for trouble shooting. The picture on page 212 shows the interior of the Engine Test Building looking along the test stands, the one on page 213 is an exterior view showing the clubs used in place of propellers and the heavy wire screen to prevent accidents, and the picture on page 214 shows the interior of one of the small disassembly and assembly rooms with a squad at work.

When the Engine Test Building was completed, Room 13 was used entirely for spare parts work on magnetos, carburetors, etc. If the School had continued it was planned to build a duplicate of the Engine Laboratory and have all work in engines concentrated in the same vicinity.

e. Laboratory Equipment. The Engines Department has had on hand a fairly large number of engines of different types, together with a number of small parts such as magnetos, carburetors, etc. Special stands for mounting engines so that they could be rotated and stopped at any given angle were devised in the school for use in the disassembly and assembly work. The Engines Department has had access to the machine shop in the Mechanics Building and quite a large amount of machine work has been done by the instructors of this department; although for a while when the department was moving into its new laboratory it was necessary to employ a regular machinist.

No attempt will be made in this report to include a complete list of equipment used by the Engines Department as it is not considered necessary for the purpose of this report. Below is a list of the principal engines on hand and in use at the time the School closed, together with the names of the principal types of carburetors and magnetos studied by the cadets in this School.

5 Liberty Motors
3 Curtiss B X Motors
1 Curtiss O X Motor
2 Curtiss O X 5 Motors
4 Hall-Scott A5A Motors
1 Hall-Scott A 7 Motor

1 Curtiss O X Motor
2 Curtiss O X 5 Motors

Plate No. 33 - Engine Test Building - view along test stands.

Plate No. 34 - Engine Test Building - showing clubs used in place of propellers.

Plate No. 35 - Engine Test Building - squadron doing disassembly and assembly work.

1 Hall-Scott A 5 Motor
4 Sturtevant Motors
2 Hispano-Suiza Motors
5 80 H.P. Le Rhone Rotary Engines
1 110 H. P. Le Rhone Rotary Engine
1 Clerget Rotary Engine
1 Gnome-Monosoupape Rotary Engine

The above engines were practically all equipped with carburetors and magnetos and in addition the School had samples of the following types of carburetors and magnetos:

5 Zenith Carburetors
2 Zenith Carburetors (Sectionalized)
5 Schebler Carburetors
1 Schebler Carburetor (Sectionalized)
7 Bosch Magnetos
5 Berkshire Magnetos
4 Berling Magnetos
2 Ignition Sets for Liberty Motor Ignition

f. Instruction. The work given by the Engines Department is extremely well outlined in the curricula of April 1, 1918, and October 14, 1918. The division of time and subjects covered has been followed at this School as outlined in the various curricula with very few minor exceptions. The work has been divided into the following main headings: Lectures on Engine Principles, Types of Engines, Shop Work and Engine Running.

The lectures on engine principles were devoted to the following topics: principles, oiling, cooling, ignition, carburetors and trouble shooting. These lectures were illustrated with charts, slides, and samples of the various types of work under consideration. The four hours on types of engines were devoted - two hours to rotary engines, one hour to Liberty, and one hour to the Hispano Suiza. These lectures were illustrated by the use of lantern slides. The picture on Page 216 shows the method of mounting a rotary engine and the spare parts board used in the lecture work on this type of engine.

The time devoted to shop work followed very closely the outline in the curriculum, the greater part of this time, of course, being spent on disassembly and assembly work. For the disassembly and assembly work the Liberty Motor and the Curtiss were used principally, although with larger squadrons it was necessary to use some of the other types.

The time devoted to engine running was very greatly increased in the last curriculum, a total of eighteen hours being called for in this work. In the early eight weeks curriculum, one hour only was devoted to engine running or trouble shooting and for a while the School was directed not to operate the engine at all in order to avoid the danger of accidents from the propeller. Later, however, permission was secured to run engines in trouble shooting provid-

1	Hall-Scott A 5 Motor
4	[illegible]
2	Hispano-Suiza Motors
5	80 H.P. Le Rhone Rotary Engines
1	110 H. P. Le Rhone Rotary Engine
1	Clerget Rotary Engine
1	Gnome-Monosoupape Rotary Engine

The above engines were practically all equipped with carburetors and [illegible] carburetors and magnetos:

5	Smith Carburetors
2	Smith Carburetors (Switzerland)
5	Schebler Carburetors
1	[illegible] Carburetor (Switzerland)
7	Bosch Magnetos
5	[illegible] Magnetos
4	Berling Magnetos
2	Ignition Sets for Liberty Motor Ignition

f. Instruction. The work given by the Engines Department is exactly [illegible] in April 1, 1918, and October 15, 1918. The division of time and [illegible] course has been followed at this School as outlined in the various curricula with very few minor exceptions. The work [illegible] lectures on [illegible] plies, Types of Engines, Shop Work and Engine Running.

The lectures on engine principles were devoted to the following [illegible] ing. These lectures were illustrated with charts, slides, and samples of the various types of work under consideration. The four hours on types of engines were devoted - two hours to rotary engines, one hour to Liberty, and one hour to the Hispano Suiza. These lectures were illustrated by the use of lantern slides. The picture on Page 216 shows the method of mounting a [illegible] of engine.

The time devoted to shop work followed very closely the outline in [illegible] assembly and assembly work. For the disassembly and assembly work the Liberty Motor and the Curtiss were used principally, although with larger squadrons it was necessary to use some of the other types.

The time devoted to engine running was very greatly increased in the last curriculum, a total of eighteen hours being called for in this work. In the early eight weeks curriculum, one hour only was devoted to engine running or trouble shooting and for a while the School was directed not to operate the engine at all in order to avoid the danger of accidents from the propeller. later, however, permission was secured to run engines in trouble shooting provid-

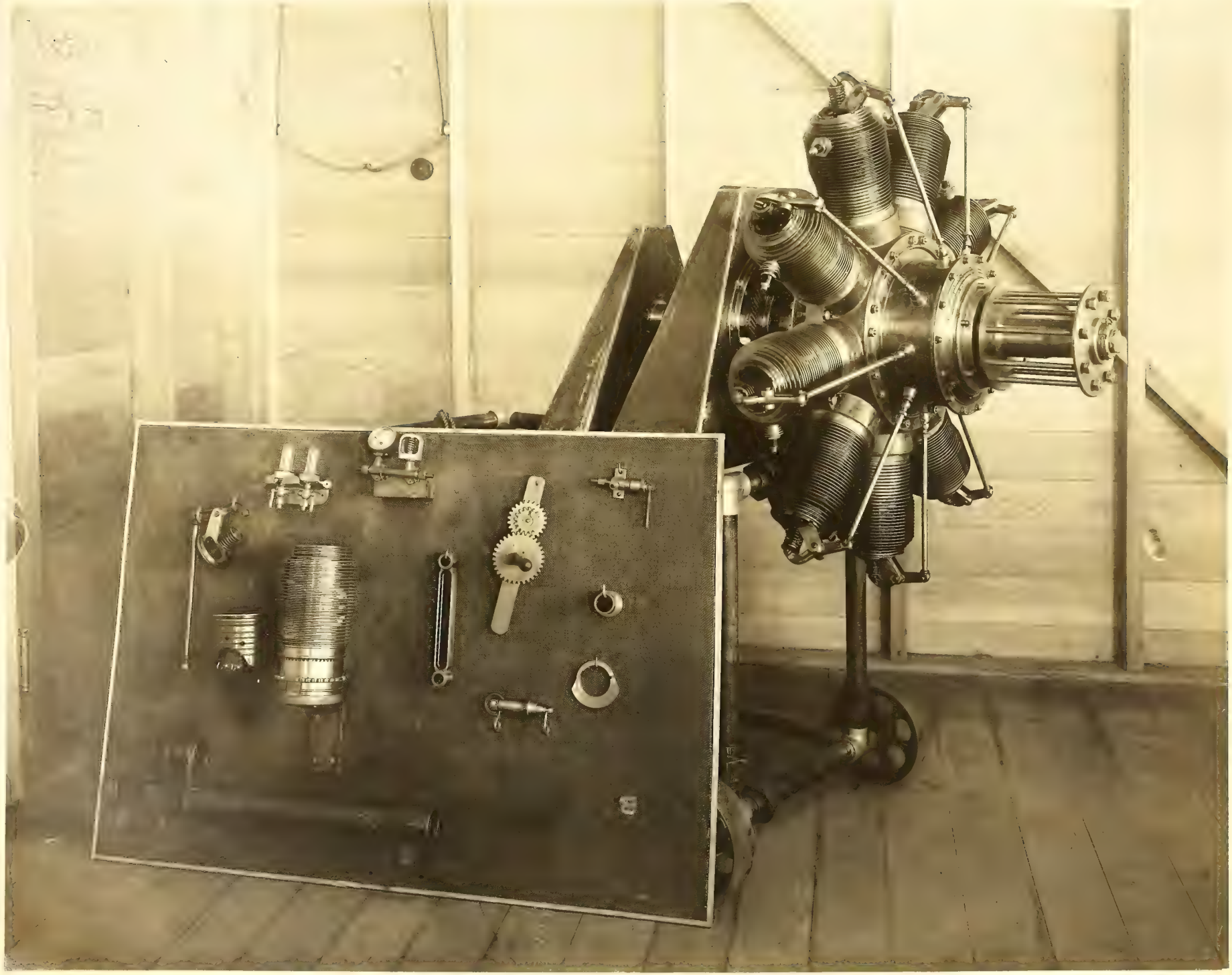


Plate No. 36 - Rotary Engine - method of mounting and spare parts board.

ing the propellers were screened off. Inasmuch as it was always the practice at this School to have the propeller screened off, operations were immediately started upon receipt of permission to continue this work. The picture on page 213 shows very clearly the precautions taken with the use of the heavy screen to prevent any possibility of accidents. The School found it advantageous to use a special club manufactured in Berkeley for the School in place of the regular propeller. These clubs greatly decreased the noise and draft caused by running the engine with a propeller.

The Engines Department has prepared a very complete syllabus covering the work as given at this School. A copy of this syllabus was furnished to each cadet and a copy is included in this report as Appendix K5

g. Examinations. Weekly and final examinations have always been conducted in the Engines Department as called for in the curriculum. Sample sets of examination questions given in this department are included in the following pages.

Squadron "F" Final Engine Examination. March 27, 1918.

INSTRUCTIONS:- Write on folded paper as you read the pages of a book. Do not request explanation of the questions.

1. Briefly describe the cylinder construction of the Curtiss OX, Hall-Scott, Hispano-Suiza, and Sturtevant engines.
(b) Give one advantage for each type of construction.

2. With the aid of a sketch, explain the operation of a gear pump.
(b) With the aid of a sketch, explain the operation of a pressure relief valve.

3. State three methods used to cool the lubricating oil for airplane engines, and name engines using each one of these methods.

4. If an engine were completely assembled with propeller attached but without starting crank, in what two ways could you determine the proper direction of rotation of the crank shaft?
(b) How could you determine its firing order?

5. Draw a wiring diagram for a battery ignition system, showing the connections for the following parts:- battery, breaker points, switch, condenser, and safety gap.

6. At what position of the armature (or rotor) should the breaker points separate on shuttle and inductor type magnetos?
(b) Why should they separate at this position?

7. If an engine using a Zenith carburetor shows evidences of a lean mixture at high speeds, and shows black smoke at low speeds, but idles satisfactorily, what changes might be made to improve the operation of the engine?
(b) What are the evidences of a lean mixture?

8. What effect does an increase in altitude have on the mixture delivered by a Zenith carburetor?
(b) Give two reasons why opening the auxiliary air valve above the carburetor (Zenith) changes the proportion of gasoline to air in the mixture.

9. With the aid of a sketch, trace the path of the oil lead that lubricates the cam block of the Gnome engine.
(b) What kind of oil does the Gnome engine use?
(c) Why is it necessary to use this kind of oil?

10. How is the cam block of the Gnome engine driven?
(b) What is its speed and direction, relative to the cylinders?
(c) Why is a portion of each piston skirt cut away, and why doesn't this cause excessive wear on this side of the piston?

[illegible] Engine Examination. March 27, 1918.

[illegible]:- [illegible] folded paper as you read the pages of a book.
[illegible] of the questions.

1. [illegible] the cylinder construction of the Curtiss OX, Hall-[illegible], [illegible], and Sturtevant engines.
(b) [illegible] advantage for each type of construction.

2. With the aid of a sketch, explain the operation of a gear pump.
(b) With the aid of a sketch, explain the operation of a pressure relief valve.

3. State three methods used to cool the lubricating oil for airplane engines, and name engines using each one of these methods.

4. If an engine were completely assembled with propeller attached but without starting crank, in what two ways could you determine the proper direction of rotation of the crank shaft?
(b) How could you determine its firing order?

5. Draw a wiring diagram for a battery ignition system, showing the connections for the following parts:- battery, breaker points, switch, [illegible]

6. At what position of the armature (or rotor) should the breaker points separate on shuttle and inductor type magnetos?
(b) Why should they separate at this position?

7. If an engine using a Zenith carburetor shows evidences of a lean mixture at high speeds, and shows black smoke at low speeds, but idles satisfactorily, what changes might be made to improve the operation of the engine?
(b) What are the evidences of a lean mixture?

8. What effect does an increase in altitude have on the mixture delivered by a Zenith carburetor?
(b) Give two reasons why opening the auxiliary air valve above the carburetor (Zenith) changes the proportion of gasoline to air in the mixture.

9. With the aid of a sketch, trace the path of the oil lead that lubricates the cam block of the Gnome engine.
(b) What kind of oil does the Gnome engine use?
(c) Why is it necessary to use this kind of oil?

10. How is the cam block of the Gnome engine driven?
(b) What is its speed and direction, relative to the cylinders?
(c) Why is a portion of each piston skirt cut away, and why doesn't this cause excessive wear on this side of the piston?

FINAL ENGINE EXAMINATION. SQUADRON M-47

July 3, 1918.

1. Name the steps necessary to time and synchronize two magnetics on an airplane engine.

2. (a) What are piston rings and why are they used?
   (b) What metal are they usually made of, and why this particular metal?
   (c) What points are to be observed in fitting new rings to piston and cylinder?

3. Describe the oiling system of the Curtiss OX engine.

4. In the Hispano-Suiza engine, explain:-
   (a) Means of adjusting camshaft setting
   (b) Means of adjusting valve clearance
   (c) Construction of connecting rod lower end.

5. (a) State possible cause of causes of a Curtiss OX engine equipped with Zenith duplex carburetor firing strongly on one bank of cylinders, while the other side gave a lean mixture excepting at high speeds, at which time all cylinders worked properly.
   (b) How would you locate air leaks in the intake manifold?

6. (a) Describe the obturator ring used in the Gnome Mono., and explain why such a ring is necessary in this engine.
   (b) Show by means of a sketch the arrangement of the planetary gears in the Gnome Mono.

7. (a) Describe the cylinder construction of the Liberty Twelve.
   (b) How and why is the compression ratio changed in this engine?

8. (a) Given an engine with propeller attached, describe two methods of finding the direction of rotation.
   (b) How would you proceed to find the firing order of this engine?

9. (a) By means of wiring diagrams, show how the primary circuit of a magneto differs from that of a battery system.
   (b) Which would you expect to be able to start easier, and engine equipped with magneto only or one having both battery and magneto ignition? Give reasons for your answer.

10. (a) Describe the cylinder construction of the Le Rhone engine.
    (b) How are these cylinders attached to the crank case?

[illegible]

[illegible] 1, 1918.

1. How the firing impulses in the two synchronous two [illegible] rotary engine.

2. (a) What are piston rings and why are they used?
(b) Just what are they actually made of, and why this particular metal?
(c) What [illegible] to be observed in fitting new rings to piston and cylinder?

3. [illegible] the valve system of the [illegible] engine.

4. In the Hispano-Suiza engine, explain:-
(a) Means of adjusting camshaft setting
(b) Means of adjusting valve clearance
(c) [illegible] of connecting rod lower end.

5. (a) State possible causes of causes of a Curtiss OX engine equipped with Zenith duplex carburetor firing strongly on one bank of [illegible] while the other side gave a lean mixture excepting at high speed at which time all cylinders worked equally.
(b) How would you locate air leaks in the intake manifold?

6. (a) Describe the obturator ring used in the Gnome Mono. [illegible] why such a ring is necessary in this engine.
(b) Show by means of a sketch the arrangement of the planetary gears in the Gnome M[illegible].

7. (a) Describe the cylinder construction of the Liberty Twelve.
(b) How and why is the compression ratio changed in this engine?

8. (a) Given an engine with propeller attached, describe two methods of finding the direction of rotation.
(b) How would you proceed to find the firing order of this engine?

9. (a) [illegible] magneto [illegible] with magneto only or one having both battery and magneto [illegible]
Give reasons for your answer.

10. (a) Describe the cylinder construction of the Le Rhone engine.
(b) [illegible] the [illegible] of the [illegible]

FINAL ENGINE EXAMINATION, SQUADRON M-66

November 20, 1918.

1. (a) Why is an odd number of cylinders used in each plane of a rotary engine?
   (b) Describe the rings used on the Gnome Monosoupape piston and state the functions of each.
   (c) Describe the Clerget connecting rod construction.

2. (a) State two good reasons for the using of castor oil in rotary engines.
   (b) Show by a sketch the operation of a gear oil pump.
   (c) Name and define three desirable qualities of lubricating oils.

3. Tell how the following troubles could be recognized from operation of engine
   (a) Intake valve held open. (b) Defective spark plug. (c) Air leak in intake manifold. (e) Too much pressure on the gasoline tank.

4. Referring to the Hispano-Suiza engine.
   (a) Describe the lower connecting rod bearings construction.
   (b) Give materials and construction of cylinders and water jacket.

5. With reference to the Zenith carburetor.
   (a) On the Hispano-Suiza engine, two sizes of compensating jets, namely 150 and 170, are used; one for cold weather and the other for warm weather. State when each is used, and why.
   (b) What is the correct throttle position for starting? Tell exactly why.
   (c) How is compensation made for increased altitude in the Liberty model.

6. (a) In the Liberty Twelve ignition system, there are two switches in the cockpit. State when each is used.
   (b) What would be the result of both of the above switches were turned on at the wrong time?
   (c) What means is employed to secure the sparks at uneven intervals, and why is this necessary?

7. State the probable causes of each of the following defects in engine operation.
   (a) Popping back in the carburetor at low speeds. (b) Sparking at the safety gap. (c) Oil pressure very low as shown by guage. (d) Overheating.

8. (a) Describe briefly the construction and function of the condenser in a high tension magneto. (b) What material is usually employed for brushes in a high tension magneto, and why? (c) State the principle differences between the Dixie and the shuttle type magneto.

9. In the Liberty engine.
   (a) Trace the path of the cooling water through the cooling system.
   (b) Show by sketch the operation of a centrifugal water pump.
   (c) What type of thrust bearing is used, and how is it oiled?

10. Name the steps (in order) necessary to time the valves of a Curtis OX engine.

1. (a) Why is an odd number of cylinders used in each plane of a rotary engine?
(b) Describe the rings used on the Gnome Monosoupape piston and state the functions of each.
(c) Describe the Clerget connecting rod construction.

2. (a) State two good reasons for the using of castor oil in rotary engines.
(b) Show by a sketch the operation of a gear oil pump.
(c) Name and define three desirable qualities of lubricating oils.

3. Tell how the following troubles could be recognized from operation of engine
(a) Intake valve held open. (b) Defective spark plug. (c) Air leak in intake manifold. (e) Too much pressure on the gasoline tank.

4. Referring to the Hispano-Suiza engine.
(a) Describe the lower connecting rod bearings construction.
(b) Give materials and construction of cylinders and water jacket.

5. With reference to the Zenith carburetor.
(a) On the Hispano-Suiza engine, two sizes of compensating jets, namely 150 and 170, are used; one for cold weather and the other for warm weather. State when each is used, and why.
(b) What is the correct throttle position for starting? Tell exactly why.
(c) How is compensation made for increased altitude in the Liberty model.

6. (a) In the Liberty Twelve ignition system, there are two switches in the cockpit. State when each is used.
(b) What would be the result of both of the above switches were turned on at the wrong time?
(c) What means is employed to secure the sparks at uneven intervals, and why is this necessary?

7. State the probable causes of each of the following defects in engine operation.
(a) Popping back in the carburetor at low speeds. (b) Sparking at the safety gap. (c) Oil pressure very low as shown by gauge. (d) Overheating.

8. (a) Describe briefly the construction and function of the condenser in a high tension magneto. (b) What material is usually employed for bushes in a high tension magneto, and why? (c) State the principle differences between the Dixie and the shuttle type magneto.

9. In the Liberty engine.
(a) Trace the path of the cooling water through the cooling system.
(b) Show by sketch the operation of a centrifugal water pump.
(c) What type of thrust bearing is used, and how is it oiled?

10. Name the steps (in order) necessary to time the valves of a Curtis OX engine.

12. OBSERVATION DEPARTMENT.

a. General. The work in this department has always included lectures on Cooperation with Artillery, laboratory work on a Miniature Range, lectures and practical work in Map Reading and at various times has included lectures on Reconnaissance, Contact Patrol, Meteorology, Bombing, Photography and Navigation. As the name of the department indicates the instruction was designed to teach proper methods of cooperation of airplanes with forces operating on the ground (especially cooperation with artillery) and also the use made of airplanes in collecting information for the ground forces.

The work in the Observation Department has always been scheduled for the later weeks of the course, having been regarded as a sort of culmination of the training of the cadets. In the original eight weeks' curriculum of June 11, 1917, no division of work by weeks was provided, but the suggestion was made by the War Department that the work in the Observation Department amounting to twenty-six hours should be placed as much as possible in the last two weeks of the course, which was done. In the eight weeks' curriculum of November 1, 1917, the work in the Observation Department totaled twenty-five hours and was given entirely in the seventh and eighth weeks.

In the twelve weeks' curriculum of April 1, 1918, the work in this department amounted to thirty-nine hours being covered in five weeks from the eighth to the twelfth inclusive. In the last revision of the curriculum, dated October 14, 1918, the work in the Observation Department was increased to such an extent that it was necessary to extend the work practically throughout the entire course. Due to the armistice the work in this department was never carried out entirely as scheduled in the revised curriculum of October 14, 1918, the work in Photographic Interpretation amounting to eighteen hours for Pilots and Bombers and thirty-eight hours for Observers being eliminated entirely and lectures on Cooperation with Artillery reduced in number.

The name of the department has been changed slightly from time to time in the different curricula; the work, however, with the exception of that scheduled in the last curriculum has remained very much the same throughout. The department has gone under the names of Aerial Observation, Aerial Tactics and Observation, the latter being the name most frequently used.

b. Staff. The work in the Observation Department at the time of opening the School was entirely new with the exception of the work to be given in Map Reading, and at that time also no instructors were available who had had experience in this work. It was necessary to place a strong man in charge of the department and have him develop the work along the lines laid down in stencils and pamphlets issued by the War Department.

Mr. E. N. D'Oyly, a graduate in Electrical Engineering of the University of California with several years engineering experience, was the first head of the Observation Department. The construction of the Miniature Ranges and the development of the work on the Range along the lines followed by this School whereby the

students work in pairs have been due to the ingenuity of Mr. D'Oyly. In April, 1918, Mr. D'Oyly left the School to undertake work in the Research Department of the Bureau of Standards at Washington and following his resignation Mr. R. A. Waite, also an engineering graduate of the University of California, (later commissioned First Lieutenant, A. S. A.), was placed in charge of the work of this department. The rotating map which was nearly completed by this School for the use of the Observation Department was constructed under the direction of Lieut. Waite who spent much time and thought upon the mechanical details of this piece of equipment. Had the work on this map not been stopped by the signing of the armistice it would have proved one of the best of its kind for the work to be done on it.

It was desirable to use technical graduates for the work in this department and this has been very largely possible. The construction and operation of the miniature range has required men having some technical and mechanical ability and the work in Map Reading has also called for men having training in engineering lines. On account of the large amount of electrical and mechanical work in connection with the Ranges constructed by the School, a mechanic has been included in the staff of this department for many months. This man was also qualified to assist in instruction on the Range.

Because of the comparatively small staff in the Observation Department, the organization of this department has not been so elaborate as required in some of the larger departments. The work has always been efficiently handled, however, as the head of the department has been able to give careful personal supervision to all details.

Appendix I-1 furnishes a complete list of the instructors who have served in the Observation Department. The following points of interest might be noted regarding the staff of this department: A total of sixteen men served as instructors in this department, thirteen of whom were university graduates; a mechanic and photographer were includedin the staff. Eight out of the sixteen served their entire period as civilians. The average length of service of instructors in this department was 8.6 months.

c. Curriculum Requirements. In taking up the curriculum requirements in the Observation Department the curricula of the following dates only will be considered:

Curriculum of June 11, 1917.
" " Nov. 1, 1917.
" " April 1, 1918.
" " Oct. 14, 1918.

The following table, showing the division by hours among the various sub-heads of the Observation Department under the different curricula, will be of interest in considering the work in this department:

students work in pairs they have been in the laboratory of the School. In April, 1918, the School left the Armory and occupied quarters in the Woolworth Building. The course in Observation is designed for training air observers, i. e., men, who are equipping planes of the military air organization, (Signal Corps, Aviation Section, Aviation Division, U. S. A.), was placed in charge of the work of this department. The preparing map which was nearly completed by this School for the use of the Observation Department was constructed under the direction of Lieut. Colonel Edward Lyman and thought upon the mechanical details of this piece of equipment. The work on this map not been stopped by the signing of the armistice. It would have proved one of the best of its kind for the work to be done on it.

It was desirable to use technical graduates for the work in this department but this has been very largely possible. The construction and operation of the miniature range has required men having some technical and mechanical training in engineering lines. On account of the large amount of electrical and mechanical work in connection with the Range [illegible] School. [illegible] has been included in the staff of this department for many months. This man was also qualified to assist in instruction on the Range.

Because of the comparatively small staff in the Observation Department, the organization [illegible] required in some of the larger departments. The work has always been efficiently handled, however, as the head of the department has been able to give careful personal supervision to all details.

Appendix I-1 furnishes a complete list of the instructors who have served [illegible]. The following [illegible] should be noted regarding the staff of this department: A total of sixteen men served as instructors [illegible] mechanic and photographer were included in the staff. Eight out of the sixteen served their entire period as civilians. The average length of service of instructors [illegible].

[illegible] :

Curriculum of June 11, 1917.
" " " [illegible].
" " April 1, 1918.
" " [illegible].

The following table, showing the division by hours among the various sub-heads of the Observation Department under the different curricula, will be of interest in considering the work in this department:

Table No. 15.
CURRICULUM REQUIREMENTS

	Total Hours Required in Curriculum of		
	6/11/17	9/26/17	11/1/17
AERIAL OBSERVATION:			
Artillery Observation	5		
Miniature Range	12		
Map Reading	4		
Reconnaissance	4		
Contact Patrol	1		
AERIAL OBSERVATION:			
Coop. with Artillery		4	4
Practical Miniature Range		12	12
Reconnaissance		2	2
Cooperation with Infantry		1	1
Photography		3	4
Examination		2	2

	Total Hours Required in Curriculum of				
	3/1/18	4/1/18	Pilots	Bombers 10/14/18	Observers
AERIAL TACTICS:					
Pursuit	1				
Bombing	2				
Reconnaissance	2				
Coop. Infantry	1				
Map Reading	14				
Coop. Artillery	4				
Artillery Obs. Range	14				
Photography	6				
Examination	2				
OBSERVATION:					
Map Reading		16			
Coop. Artillery		5			
Artillery Obs. Range		16			
Examination		2			

Map Reading 18

Examination 2

	Total Hours Required in Curriculum of 10/14/18		
	Pilots	Bombers	Observers
OBSERVATION:			
Maps	18	18	18
Examination	1	1	1
Navigation	15	15	15
Metorology	2	-	-
Examination	1	1	1
Coop. Artillery-Lectures	5	-	5
" " Range	4	-	4
Examination	-	-	1
Photo Interpretation	18	18	36
Examination	2	2	2
Bombing	-	9	-
Examination	-	1	-

It will be noted that the eight weeks' curriculum of June 11, 1917, provided for five hours lectures on Artillery Observation, twelve hours laboratory work on the Miniature Range, four hours Map Reading, four hours Reconnaissance and one hour on Contact Patrol.

In the eight weeks' curriculum revised November 1, 1917, very little change was made in this department except that the lectures on Reconnaissance were reduced to two, and four hours Photography were added, also the work in Map Reading was transferred to the Aids to Flight Department.

In the twelve weeks' curriculum of March 1, 1918, the name of this department was changed to Aerial Tactics and several additional subjects were added. As this curriculum was superseded by the curriculum of April 1, 1918, before the March 1918 curriculum had become effective in this department, it will not be necessary to discuss a number of these subjects which were eliminated in the curriculum of April 1, 1918. This latter curriculum transferred Map Reading back to the Observation Department and provided a large increase in the time devoted to this subject, alloting sixteen hours instead of eight hours given under the eight weeks' course. Five hours lectures on Cooperation with Artillery and sixteen hours laboratory work on the Miniature Range completed the work under the April, 1918, curriculum.

The curriculum of October 14, 1918, very materially changed the work given in the Observation Department. By referring to the table above it will be noted that the work of the department was divided into the following subheads:

Maps,
Navigation,
Cooperation with Artillery,
Photo Interpretation,
Bombing,

Total Hours Required in Curriculum of

Instruction - Observation.

The nine hours in Bombing were to be taken by the Cadets selected for the Bombing Course only. The course in Photo Interpretation consisted of eighteen hours for Pilots and Bombers and thirty-eight hours for Observers, but due to the signing of the armistice the work in Photo Interpretation was eliminated from the curriculum. The course in Navigation consisted of fifteen hours lecture and problem work and was done by the cadets in all three schools - Pilots, Bombers, and Observers. The October, 1918, edition of the curriculum provided for separate examinations under the various sub-heads noted above, which was considered a very desirable plan by the staff of this department.

d. Laboratory Space. In the original Aeronautical Laboratory Building, Room 14 was assigned to the Observation Department as a laboratory for the Miniature Range work. This room was 27' x 27' and had a balcony on three sides of the room at an elevation such that the eye of the observer would be about 16' above the floor. The room had a capacity of twenty-six men, thirteen in the balcony and thirteen at the benches on the floor. With squadrons split in two sections it could accommodate squadrons of fifty-two men. A map approximately 22' x 22' was painted in accordance with instructions from the War Department and mounted on the floor in this room for use as a Miniature Range laboratory.

Upon the completion of building No. 2 a new miniature range was constructed in Room No. 11, this laboratory having space available for seventy-two men, thirty-six in each of the two balconies.

The twelve weeks' course provided under the curriculum of March and April, 1918, called for a rotating map to be used for the work on the Miniature Range and Map Reading. Upon authority from Washington, construction of this range was delayed for some time. In October, 1918, however, a new building, shown as No. 5 in the sketch on Page 63 , was constructed for the use of the Observation Department entirely, this building to house a rotating Map. The building was approximately 40' x 40' feet, containing two circular balconies and the rotating map twenty-six feet in diameter. This building was never completed and put into operation due to the signing of the armistice.

e. Laboratory Equipment. The principal equipment used for laboratory work in the Observation Department was the Miniature Range. The original map mounted on the floor in Room No. 14 was painted by a sign painter and, while properly drawn to scale, the painting was not exceptionally well done. Twenty-six telegraph keys and head phones were mounted in this room so that thirteen pairs of men could work together simultaneously. Fin pointing was done by using colored flags placed at various points on the map. Shell bursts were represented by flashes of miniature lamps which were controlled by switches operated by men serving as "battery commanders". A picture of the original Miniature Range which was installed in Room 14 is shown on page 226.

In January, 1918, a new Range was put into operation and the old one dismantled. This new Range was built in a room (Room 11) in the new West Addition to the Laboratories especially designed for a Miniature Range. The painting representing the country (about the same section of Belgium as that used on

The work heretofore in Bombing was to be taken by the Cadets selected for the Bombing Course only. The course in Photo Interpretation consisted of eighteen hours for pilots and observers and thirty-eight hours for Observers, but due to the signing of the armistice the work in Photo Interpretation was eliminated from the curriculum. The course in Bombing consisted of fifteen hours for pilots and two hours for observers. The course in all lines covered in all three schools - Pilots, Observers, and Bombers. The outline, 1918, outline of the instruction provided for practical instructions under the various sub-heads noted above, which was considered a very desirable plan by the staff of this department.

b. Laboratory space. In the original Government (temporary) building, Room 17 was assigned to the Observation Department as a laboratory for the aviation range work. This room was 17' x 23' and had a ceiling of about 12' above the floor at its highest point that the eye of the observer would be able to see over the range. The room had a capacity of twenty-six men, thirteen in the balcony and thirteen at the benches on the floor. With squadrons split in two sections it could accommodate squadrons of fifty-two men. A map approximately 12' x 20' was placed in anaglyphs with instructions upon the range ment and mounted on the floor in this room for use as a Miniature Range Laboratory.

Upon the completion of building No. 2 a new miniature range was constructed in Room No. 11, this laboratory having space available for seventy-two men, thirty-six in each of the two balconies.

The twelve weeks' course provided under the curriculum of March and April, 1918, called for a rotating map to be used for the work on the miniature range. [illegible] Upon completion of the first [illegible], [illegible] was delivered to each class. In October, 1918, however, a new building was [illegible] for the use of the Department of Aerial Gunnery. This building was [illegible] and put into operation due to the signing of the armistice.

c. Laboratory Equipment. The principal equipment used for laboratory work in the Miniature Range Laboratory [illegible] was anaglyphs mounted on the floor in Room No. 14 was painted by a sign painter and, while pairs of men could work together simultaneously. Fin pointing was done by using colored [illegible] pins on the map. Small [illegible] were manufactured by Fisher [illegible] which were [illegible] ed by men serving as "battery commanders". A picture of the original Miniature Range which was installed in Room 14 is shown on page 226.

In January, 1918, a new Range was put into operation and the old one dismantled. This new Range was built in a room (Room 17) in the new [illegible] building [illegible] the laboratory [illegible] the [illegible] for [illegible] the [illegible] representing the country [illegible] the [illegible] plan [illegible]

Plate No. 37 - Original Miniature Range, formerly in Room 14.

the first Range, shown in the upper center section of the maps furnished by the Signal Corps) was on cloth, 23' x 27', scale 1 to 720, and was executed by Professor P. W. Wahl of the Drawing Department. The side walls, 9' high, were painted to represent sky and clouds and, around the base, the landscape was painted off into the horizon. This laboratory was capable of accommodating thirty-six pairs of men or a class of seventy-two. The Battery Commanders were placed in a gallery 9' above the floor so that they could observe at the same time that they were acting as instructors. The Observers were in a gallery 16' above the floor, representing an elevation of 11,000'. Each man had a separate desk and observed by looking sideways down over the rail. A picture of this Range showing the map is shown on page 228, and the picture on page 229 is taken looking along one side of one of the balconies. On each Observer's desk was a telegraph key, a head phone and a signal lamp. He could thus send messages to the Battery Commander and he could receive messages either aurally or visually, the communicating circuits being controlled from the office as indicated on the Wiring Diagram for the Rotating Range. On each Battery Commander's Desk was a head phone, a telegraph key and also a sliding tray on which he could form "ground strip messages". The tray could then be pushed out beyond the screen(which hung between the two galleries)for the Observer to see. Each Battery Commander could operate twelve "bursts" around his target. As one of these was a direct hit ("B") and two of them were numerals used in the pin-pointing exercise, it was found advisable to take these three lights off the switches on the Battery Desks and put them on circuits controlled from the office.

The following report on the Rotating Map constructed at this School was prepared by Lieut. Waite, head of the Observation Department, who deserves much credit for the original design and ideas involved. Had the war continued, this map would have proved a valuable piece of equipment.

In September, 1918, a Rotating Observation Range was started. This was modeled after the Stationary Range with certain improvements and alterations made necessary by the rotating floor. In order to make the "observing qualities" of the two galleries more nearly equal, the lower gallery was built 12' above the "ground" ("painting" or "map") and the upper gallery 7' above this. The cadet in the upper gallery observed from a height of about 22' and his angle of vision was but slightly different from that of the cadet in the lower gallery. The building was 40' square and 35' from the ground floor to the eaves. The desks were laid out around a circular opening in the floor; the lower gallery, 24' in diameter, the upper, 21'. The difference was intended to allow the upper gallery to overhang thereby allowing for the screen between the two galleries, as well as to prevent the Observer from seeing the stationary side, wall, or curtain, straight below him. This was practicable because the Observers' desks were not so wide as the Battery desks, the widths being 12" and 16", respectively. Lights, for illuminating the "Ground", were just below the lower gallery, on the inside of the circular opening. The room was designed for a class of fifty-six men, or twenty-eight pairs of cadets. On two sides of the building, was a 10' space for offices, etc., up to the floor of the lower gallery. In other words, the center of the circular openings in the floor was at the center of a 30' square. This allowed

The first Range, shown in the upper center section of the maps furnished by the Elementary Department, was a rectangle, 28' x 27', scale 1 to 720, and was executed by Professor [illegible], Head of the Drawing Department. The side walls, 9' high, were painted in experimental gray and olounda and, around the base, the landscape was painted on the floor. This laboratory was capable of accommodating thirty-six pairs of eyes, or a class of seventy-two. The Battery Commanders were seated in a gallery 3' above the floor on the first high [illegible] at the rear of the room and they were acting as instructors. The Observers were in a gallery 12' above the floor, representing an elevation of 11,000'. Each man had a separate desk and was observed by looking sideways down over the rail. A picture of this Range showing the map is shown on page 228, and the picture on page 229 is taken looking from the rear of one of the Battery Commanders.

Observer's desk was a kitchen table, a hand glass and a signal lamp. He could time and measure in the usual manner and he could communicate with the Battery Commander either verbally or visually, the communicating circuits being controlled in the office by instructors on the mirror diagram for the Rotating Range. On each Battery Commander's desk was a head phone, a telegraph key and also a mirror on which he could form "ground strip messages". The tray could be pushed out beyond the screen(which hung between the two galleries)for the convenience of [illegible]. Each Battery Commander could operate twelve "bursts" around his target. As one of these was a direct hit ("B") and two of them were numerals used in the pin-pointing exercise, it was found advisable to have these three lights off the switches on the Battery Desks and put them on circuits controlled from the office.

The following report on the Rotating Map constructed at this School was prepared by Lieut. Waite, head of the Observation Department, who deserves much credit for the original design and then installed. [illegible] this map would have proved a valuable piece of equipment.

In September, 1918, a Rotating Observation Range was started. This was modeled after the [illegible] Range with certain improvements and alterations and necessary [illegible]. It was to make the "observation qualities" of the [illegible] equal, the lower gallery was still 12' above the "ground" ("painting" or "map") and the upper gallery 7' above this. The [illegible] of the [illegible] differed from of 20' and his angle of vision was but slightly different from that of the cadet in the lower gallery. The building was 40' square and 38' from the ground floor to the eaves. The desks were laid out around a circular opening in the floor; the lower gallery, 24' in diameter, the upper, 12'. The difference was intended to allow the upper gallery to overlook slightly [illegible] between the two galleries, as well as to prevent the observer from seeing the [illegible] of the [illegible] or [illegible] [illegible]. This was practically [illegible] because the Observers' desks were not so wide as the Battery desks, the width being 18" and 16", respectively. Hence, the diameter of the "ground", was just below the lower gallery, on the inside of the circular opening. The room was designed for a class of [illegible] men, or twenty-eight pairs of eyes. In the place of the [illegible], was a 10' space for [illegible], to the floor of the lower gallery. In other words, the center of the circular opening in the floor was at the center of a 30' square. This allowed

Plate No. 38 - Second Miniature Range - Room 11

Plate No. 39 - Miniature Range - view along balcony - Room 11

for a very large space toward one corner (NW Corner) of the upper gallery, which was to be used for a class room in connection with Range work. The painting was supported on a 25' wood ring covered with #14 poultry netting and fly screen. This surface was supported 8' above the floor by slanting struts to a circular platform 18' in diameter. This platform revolved on a maple track on twelve ball-bearing, steel wheels, 4" diameter and 1" face. It was fixed at the center on a 4" pipe pivot. This pipe, reduced to 3", continued up to within a few inches of the wire netting. It acted as a conduit for the wires and as a support for the collector rings. These were made up on nine maple discs, 28" in diameter, each carrying forty-four separate rings. The individual rings were made of strips of brass $\frac{1}{8}$" wide and set on edge in concentric grooves cut in the face of the disc, $\frac{1}{4}$" apart. Each brush yoke carried forty-four phosphor bronze brushes. The brush yoke was centered on the pipe and the outer ends on each side were threaded on a long rod. The whole brush rigging, then, was fixed to revolve with the platform. The driving unit was an electric dumb-waiter machine, with a 52 to 1 worm gear reduction and automatic, remote control ("Right", "Left", and "Stop") from the ground floor and from the upper gallery. The motor was 1 HP, 220 V, D.C., but the poles were connected in parallel and it was used on 110 V, giving half speed. A 9" driving sheave with a rope belt around the 18' platform and 2 direction and 1 tightener idler, gave a speed of about $\frac{1}{2}$ RPM for the platform. Field regulation on the motor made it possible to increase this speed to almost 1 RPM.

The actual construction did not proceed beyond this point. The "Painting" (scale, 1 to 667) was completed by Professor P. W. Mahl, of the Drawing Department, but never installed. On it were twenty-eight indications of enemy battery positions and a vertical photograph was taken of each of these (scale about 1 to 5,000). Samples of two of these "aerial" photographs are shown on pages 231 and 232. It was intended to furnish each "Observer" and each "Battery Commander" with a photograph of his target. There was a cylindrical curtain, 24' in diameter, painted with cloud effects, to drop from the lower gallery to within a few inches of the "Ground" surface. The electrical layout, with Instructors' Desks, etc., is shown on the Wiring Diagram, explanation of which is given in the following pages.

It is believed that the construction here described would have proved entirely satisfactory. The design was made by R. A. Waite, head of the department at this time, in conjunction with Professor B. F. Raber of the College of Mechanics.

The wiring for the communicating circuits between respective Observers and Battery Commanders is shown in the upper gallery. The Battery Commander receives messages by "wireless" (buzzer) only, but the Observer may receive messages either aurally or visually and each of these circuits is controlled from the main Instructor's Desk. It is necessary for the Observer to let out his Aerial and put in his Safety Plug before the circuit is completed. By means of a double head-phone with four cords and clips, the instructor may "listen in" on any pair of men from any one of four instructor's desks, in opposite corners of each gallery. -For instance, if the instructor wished to listen to pair #12, he would clip one phone from "Ob" to "12" (upper) for the Observer and the other phone from "Bat" to "12" (lower) for the Battery Command-

For a very large space toward one corner (NE Corner) of the upper gallery, which was to be used for a place from to examination with sleep work. The building was supported on a 12' wide ring covered with the gallery matting and 12' across. This ring was supported 7' above the floor by floating stirrups to a circular platform 12' in diameter. This platform rotated on a pipe, 4" diameter and 1" inch. It was timed at the main-shaft by steel shafts. This pipe, reduced to 3", continued up to within a meter on a 4" pipe first. This pipe, reduced to 3", continued up to within a few inches of the ceiling. It ended in a crossbar for the wires and in a support for the ceiling fixture. These were made up of angle irons, 12" in diameter, each carrying forty-four separate rings. The individual rings were made of strips of iron 1" wide and bent in semicircular grooves and in the form of the letter "U" upside down. Each brush yoke carried forty-four phosphor bronze brushes. The brush yoke was supported on the pipe and had four arms, each side were bussended on a long rod. The whole brush rigging, then, was fixed to revolve with the platform. The driving unit was an electric drum-("Right", "Left", and "Stop") from the ground floor and from the upper gallery. The motor used on 110 V, giving half speed. A 9" driving sheave with a rope belt around the 18' platform and 2 direction and 1 tightener idler, gave a speed of about 3 RPM for the cylinder. Field resistance on the motor made it possible to increase this speed to almost 1 RPM.

The actual construction did not proceed beyond this point. The "Painting" (scale, 1 to 667) was completed by Professor P. W. Wahl, of the Drawing Department, but never installed. On it were twenty-eight indications of one-about 1 to 3,000). Samples of two of these "aerial" photographs are shown on pages 221 and 282. It was intended to furnish each "Observer" and each "Battery Commander" with a photograph of his target. There was a cylindrical curtain, 24' in diameter, painted with cloud effects, to drop from the lower gallery to within a few inches of the "Ground" surface. The electrical layout, with Instructors' Panels, etc., is shown on the Wiring Diagram, explanation of which is given in the following pages.

It is believed that the construction here described would have proved satisfactory. The basic idea was by A. A. Stone, head of the Physics Department, in consultation with Professor E. F. Lindman of the Electrical Engineering.

The wiring for the communicating circuits between respective Observers and Battery Commanders is shown in the upper gallery. The Battery Commander receives messages by "wireless" (buzzer) only, but the Observer may receive messages from the main Instructor's Desk. It is necessary for the Observer to let out his Aerial and put in his Safety Plug before the circuit is completed. By "Listen in" on any pair of men from any one of four instructor's desks, in opposite corners of each gallery. For instance, if the instructor wished to listen to pair #12, he would clip one phone from "Ob" to "12" (upper) for the Observer and the other phone from "Bat" to "12" (lower) for the Battery Command-

Plate No. ~~42~~ 40 - "Aerial Photograph" of targets on Rotating Map.

Plate No. ~~45~~ 41 - "Aerial Photograph of targets on Rotating Map.

er. At the Main Instructor's Desk in the Upper Gallery, there are switches by which all of the telegraph keys may be short-circuited and the instructor may then send to the entire class. By connecting in the "machine" to the proper studs, a graphical record of any man's sending may be taken.

On each Battery Desk, there is a Master Switch, 12 Single Switches and 6 Salvo Switches. The Master Switch must be pressed and held down before any of the other switches will operate. In going down, it lights the Battery Flash but this goes out before the blade of the switch touches the "common" bus for the table. The "hits" or "target lights" may be operated in groups from the control board (off the rotating platform), or, by means of the double-throw switches, they may be substituted for the twelfth "burst" on the respective tables as desired.

All switches and studs below the slip-rings are on the control panel near the center of the rotating platform. From this panel, the 100 numerals or any of the bursts may be controlled. The "bursts" are turned on by making connection with a flexible lead with clips on either end. Any light may be operated in this way when all of the desk circuits may be dead.

The double-throw switches in the common return of each group (or desk) will allow certain of the desks to be operated from the second gallery when all others are dead. The snap switches in the lower gallery allow further control in this respect without the instructor returning to the ground floor.

The double-throw switches used in connection with the "target-lights" and the twelfth bursts are placed off the platform so as to allow these bursts to be usedon the salvo switches regardless of which one may be on the twelfth switch and still have but one slip-ring for each light.

The transformer is on the ground floor but may be controlled from any floor as indicated.

The wiring diagram referred to above is shown on page 234. The wiring diagram on page 235 was laid out to show the automatic operation for the "battery flash" and "shell burst" with proper time intervals between, the results to be obtained by the use of time limit relay switches. Lieut. Waite was working on this problem at the time the armistice was signed and believed it a possibility and a desirable feature. The following report prepared by Lieut. Waite explains the wiring diagram on page 235 showing automatic operation of the work on the rotating range.

An airplane observer, when directing artillery fire, generally flies at right angles to his Battery-Target line, back and forth, about half way between the two. When ready, he sends the signal "Fire!" and watches his own battery position for the flash which means the discharge of the piece. He knows, quite closely, the "Time of Flight" of the projectile from the battery with which he is working, so, when he sees the flash of the piece, he

[illegible] Desk in the Upper Gallery, there are switches by which all of the [illegible] may be short-circuited and the Instructor may listen [illegible] by connecting in the "meaning" to the proper [illegible] 's speaking may be taken.

[illegible] there is a Master Switch, 12 Single Switches and a Delay [illegible]. The [illegible] pressed and held down before any of the [illegible] switches will operate. In going down, it lights the Battery Flash and [illegible] goes out before the blade of the switch touches the "common" bus for the [illegible]. The "Delay" or "Target Light" may be operated in [illegible] from the control board (off the rotating platform), or, by means of the double-throw switches, they may be substituted for the [illegible] "Target" on the respective tables as desired.

All switches and studs below the slip-rings are on the control panel near the center of the rotating platform. From this panel, the [illegible] may be [illegible] by making connection with a flexible lead with clips on either end. The light may be operated in this way from all of the desk [illegible].

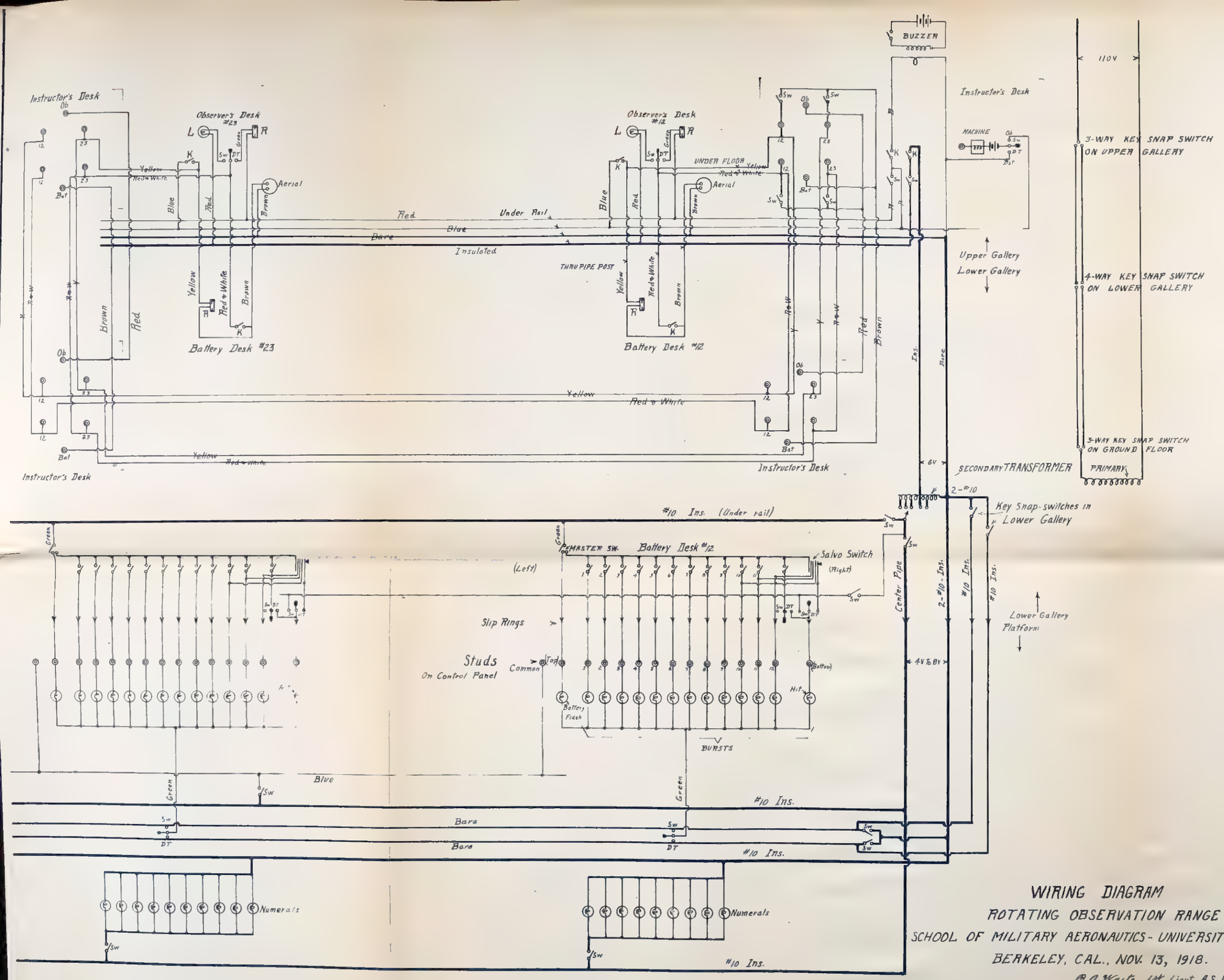
The double-throw switches in the common return of each group (or desk) will allow studs at the desks to be operated from the general [illegible] from all desks [illegible]. The same switches in the lower gallery allow further [illegible] to [illegible] the instructor [illegible] to the ground floor.

The double-throw switches used in connection with the "Target" and the [illegible] lights are placed out the [illegible] so as to [illegible] these buttons to be used on the saivo switches regardless of which one may be on the [illegible] and still have the slip-ring for each light.

The transformer is on the ground floor but may be controlled from any floor as indicated.

The wiring diagram referred to above is shown on page 286. The wiring diagram on page 288 was laid out to show the automatic operation for the "battery flash" and "shell burst" with proper time intervals between, the results to be obtained in the case of this [illegible] relations. [illegible] [illegible] at the time the [illegible] and [illegible] [illegible] [illegible] and a [illegible] [illegible]. The [illegible] [illegible] the wiring diagram [illegible] in operation of the work on the rotating range.

An airplane observer, when directing artillery fire, [illegible] flies at right angles to his Battery-Target line, back and forth, about half way between the [illegible]. When ready, he sends the signal "Fire!" and watches his own battery position for the flash which means the discharge of the piece. He knows, quite closely, the "Time of Flight" of the projectile from the battery with which he is working, so, when he sees the flash of the piece, he

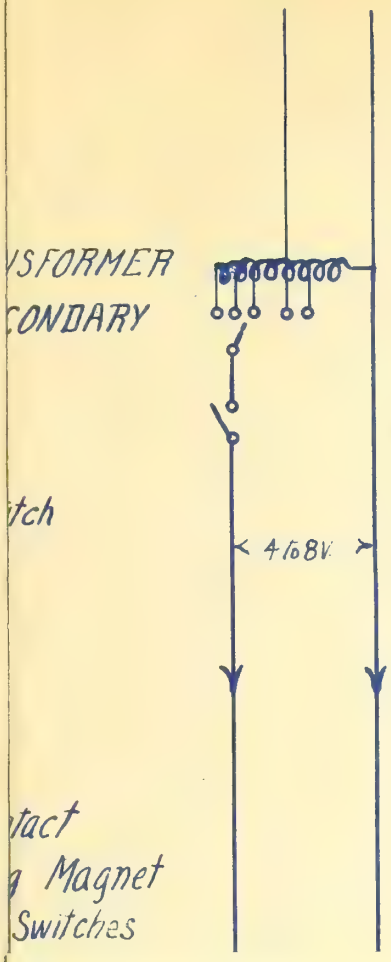


WIRING DIAGRAM
ROTATING OBSERVATION RANGE
SCHOOL OF MILITARY AERONAUTICS - UNIVERSITY OF CALIFORNIA
BERKELEY, CAL., NOV. 13, 1918.

R. A. Waite, 1st Lieut., A.S.A.

28 OBSERVER'S DESKS 2 SHOWN
28 BATTERY COMMANDER'S DESKS " "
2 INSTRUCTOR'S DESKS IN EACH GALLERY
1 CONTROL PANEL ON ROTATING PLATFORM.
All Switches and Studs shown below Slip-rings are on this Panel.

LAMP. L = SIGNAL LAMP.
STUD FOR CLIP CONNECTION.
Sw. = SWITCH. D.T. = DOUBLE THROW.
K = TELEGRAPH KEY.
R = HEAD RECEIVER.


NSFORMER
CONDARY
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4 to 8V.
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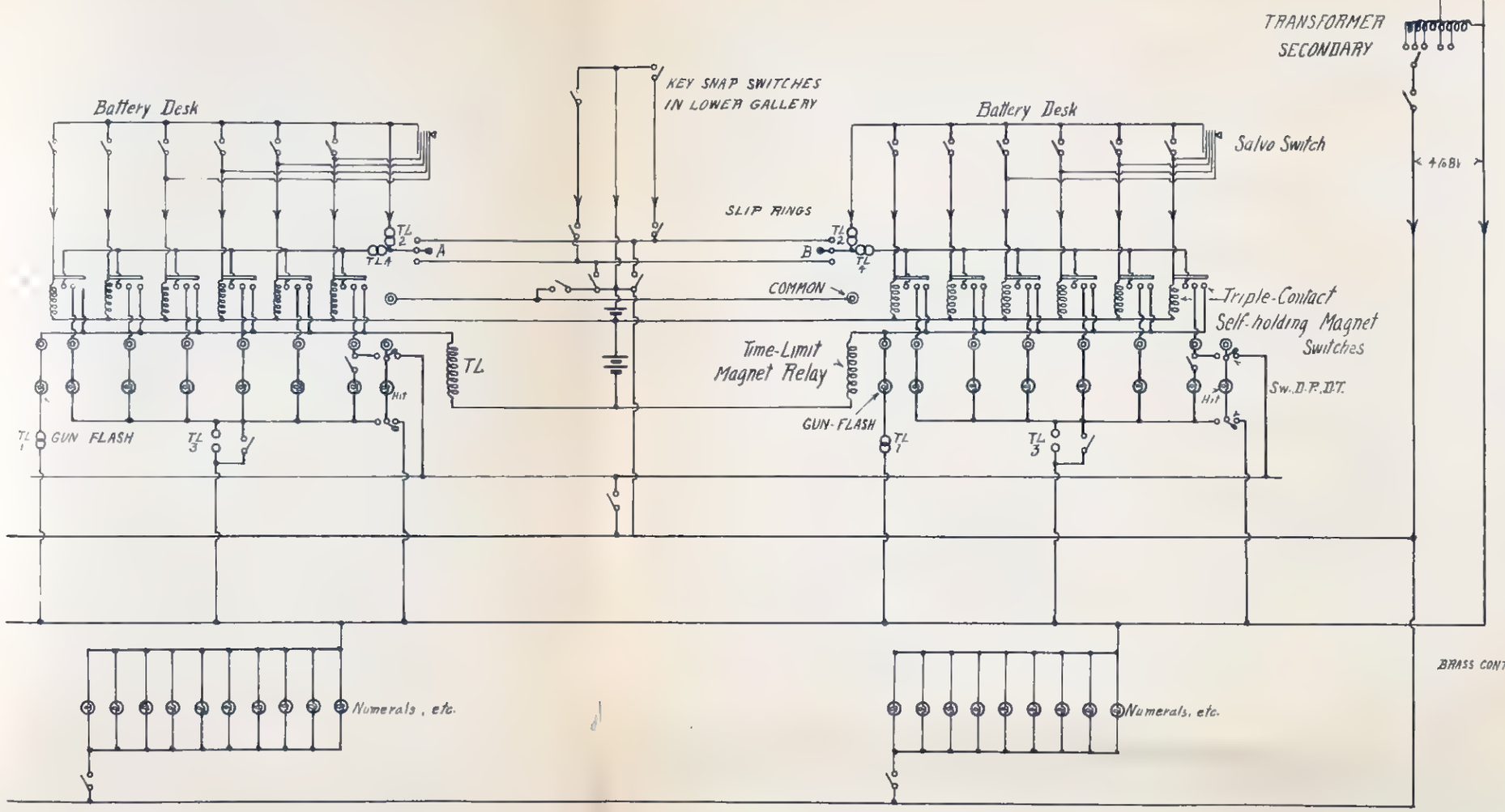
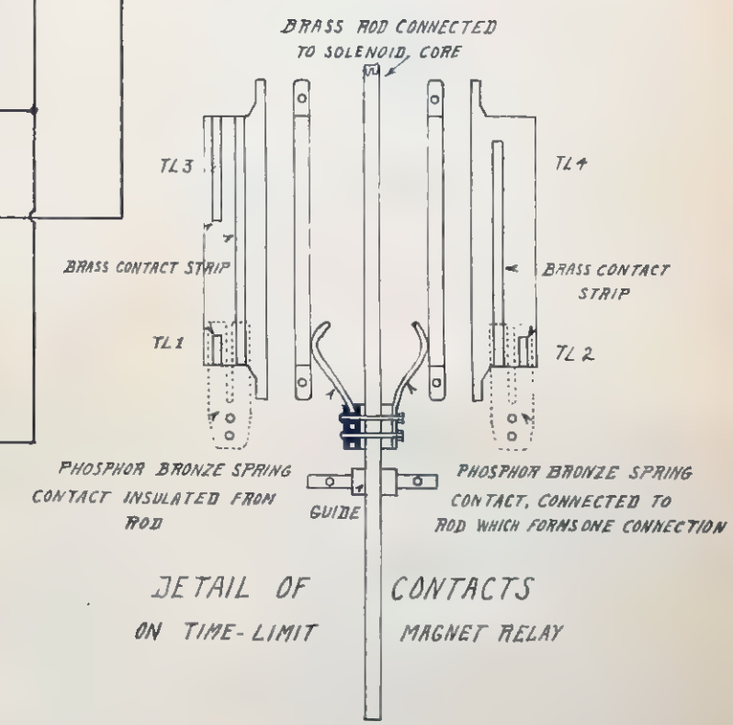
Switches





DETAIL OF CONTACTS ON TIME-LIMIT MAGNET RELAY

LAMP, - Representing "BURST", "GUN FLASH", etc.

STUD FOR CLIP CONNECTION

All Switches and Studs shown below Slip-rings are on Control Panel

WIRING DIAGRAM

ROTATING OBSERVATION RANGE

AUTOMATIC OPERATION

SCHOOL OF MILITARY AERONAUTICS - UNIVERSITY OF CALIFORNIA

BERKELEY, CAL., DEC. 6, 1918.

R. A. Waite, 1st Lieut., A.S.A.

starts his stop-watch. After the proper lapse of time (which may be, roughly, from 15" to 55") he turns and concentrates all his attention on the target. The burst will be visible for perhaps 5" or more, but it soon spreads and corrections will then be inaccurate. So the observer must note the burst and determine the correction (with the aid of a photograph, if he has one) immediately it appears.

On the Miniature Range, electric lights, under a translucent painting representing the ground, are used to indicate the "Gun-Flash" and the "Burst". There should be a certain time sequence in operating these lights, as follows:- The Observer sends "Fire!" and (within 10" or not at all - French) the Battery Commander presses a switch which lights the "Gun-Flash". This should be on not longer than 1". After a certain number of seconds representing the "time of flight" of the projectile (on the Range, this may be cut down to 10", to save time) the Battery Commander should press a switch which lights the "Burst". This should not be on longer than 5". There should always be a "Gun-Flash" before a "Burst", and, of course, the two should never be on together.

We have used the system of working the cadets in pairs, one acting as observer and the other as battery commander. This latter does the "firing", at his own target, of course. On the stationary Range, we had desks for thirty-six pairs of cadets, thirty-six targets and each battery commander had twelve "shots" at his target. It is an excellent system, in that all the men can work the full period and a small number of instructors can handle a comparatively large class. On the new Rotating Range, we planned to have the same arrangement with accommodations for twenty-eight pairs of cadets, the painting being twenty-four feet in diameter.

As stated, this system has proved excellent from the standpoint of time and the amount of practice gotten by each man, but there was always a great deal of difficulty in teaching the battery commanders to operate the lights in the proper time sequence. This takes the time of the instructor as well as that of the cadet and is, in fact, entirely irrelevant to the subject to be taught. The arrangement shown in the accompanying Wiring Diagram is suggested as a means of overcoming this difficulty.

There, is required for each burst, a Triple-contact Self-holding Magnet Switch, with an arm which is drawn in, short-circuiting three contacts when the coil is energized. This switch can be made from an ordinary buzzer and operated from one storage cell. There is also required, one for each Battery Desk, a Time Limit Magnet Relay with four sliding contacts (3 breaking and 1 making) as indicated on the diagram. It, of course, must have a solenoid with plunger and yoke and a compression dash-pot. These can be made up (Western Electric Company) in small quantities for from $35.00 to $40.00.

Any one of the switches on the Desk is pressed momentarily. The proper triple-contact switch is energized and closed. The first contact makes the switch self-holding by completing the circuit thru TL 4 and to the battery. The

On the Miniature Range, electric lights, under a transluscent painting representing the target, are used to indicate the "Gun-Flash" and the "Burst". There should be a certain time sequence in operating these lights, as follows:- The operator sees the "Flash" and (without ~~of~~ or not at all) the Battery Commander presses a switch which lights the "Gun-Flash". This should be on for longer than 1". After a certain number of seconds (depending on the Range) the "time of flight" of the projectile (on the Range, this may be cut down to 10", to save time) the Battery Commander should press a switch which lights the "Burst". This should not be on longer than 1". Under ideal circumstances, the "Gun-Flash" before a "Burst", and, of course, the two should never be on together.

As observer and the other as battery commander. This latter does the "firing", at his own target, of course. On the stationary Range, we had decks for thirty-six pairs of cadets, thirty-six targets and each battery commander had twelve "sinks" at his target. It is an excellent system, in that all the men can work the full period and a small number of instructors can handle a comparatively large class. On the new Rotating Range, we planned to have the same arrangement four feet in diameter.

As stated, this system has proved excellent from the standpoint of time and the amount of practice gotten by each man, but there was always a great deal of difficulty in teaching the battery commanders to operate the lights in the proper time sequence. This takes the time of the instructor as well as that of the cadet and is, in fact, entirely irrelevant to the subject to be taught. The arrangement shown in the accompanying Wiring Diagram is suggested as a means of overcoming this difficulty.

There, is required for each burst, a Triple-contact Self-holding Relay, the coil is energized. This switch can be made from an ordinary buzzer and making) as indicated on the diagram. It, of course, must have a solenoid with Electric Company) in small quantities for from $35.00 to $40.00.

Any one of the switches on the Desk is pressed momentarily. The proper triple-contact switch is energized and closed. The first contact makes the

second contact, connects in the proper "Burst" light but this will not light because the contact, TL 3, in the common return, is open. The third contact completes the circuit for the "Gun-Flash" and also for the Time Limit Relay. As soon as the plunger for the Time Limit Relay starts to move up, contact TL 1 opens and the "Gun-Flash" goes out. At the same time, contact TL 2 opens which breaks the circuit to the Battery Desk, so that no other circuits can be energized until this operation has completed itself. After about 10", contact TL 3 will close and the proper "Burst" will show, depending upon the Triple Contact Switch which has previously been closed. After about 15", contact TL 4 will open, breaking all the circuits to the Triple Contact Switch, which will open. It will not, of course, close again until the proper switch on the Battery Desk is closed. The Time Limit Relay immediately drops back to its starting position, closing TL 1, TL 2 and TL 4 and opening TL 3 and the whole arrangement is ready for the next operation. If a salvo switch on the Battery Desk is closed, 4 Triple Contact Switches will close at the same time and 4 "Bursts" will be in position to operate when TL 3 closes; otherwise the operation will be the same.

It is thus seen that the device is self-completing and self-resetting and it cannot be interfered with, once it is started.

In order to reduce the effect of line drop which will have considerable effect on the action of the Time Limit Relays, it is desirable to have the voltage for this circuit as high as practicable. The Triple Contact Switches, if made from buzzers, must be operated from only one storage cell in order that the coils will not over-heat. The lights may be operated from the A. C. Transformer circuit.

By means of the double-throw switches, A, B, etc., certain desks may be set to operate when the others are "dead", then, by means of the snap switches in the Lower Gallery, the instructor may energize all tables when he is thru with the demonstration or test, without having to return to the ground floor. By means of the Studs, which are suitably arranged in groups on a control panel, and a flexible lead with clips on either end, any of the lights may be operated by an instructor, from the rotating platform, without operating any of the magnet switches and without energizing any of the desks. For this work, contact TL 3 must be short-circuited.

The chart on page 238 shows the wiring diagram for automatic control of the driving motor for the Rotary Range.

The picture on page 239 shows a sample table with salvo switches. These tables were being installed in the range in Room 11 and were to have been installed in the Rotary Range. The picture on page 240 shows the rotating element for the Rotary Range partially completed.

For the laboratory work in Map Reading the School used a large number of French and British maps sent out by the War Department; also for field work, seventy-two small sketching boards having compasses mounted on them were constructed. Various models have been used to illustrate the op-

[illegible] the proper "Burst" light but this will not light because the contact, TL 3, in the common return, is open. The third contact completes the circuit for the "Gun-Flash" and also for the Time Limit Relay. As soon as the relay for the Time Limit Relay starts to move up, contact TL 2 closes and the "Gun-Flash" goes out. At the same time, contact TL 2 opens which breaks the circuit to the Gun-Flash light. After which contact TL 3 will close and the proper "Burst" will show, depending upon the Triple Contact Switch which has previously been closed. After about 15", contact TL 4 will open, breaking all the circuits to the Triple Contact Switch, which will open. It will not, of course, close again until the proper switch on the Battery Desk is closed. The Time Limit Relay immediately drops back to the starting position, closing TL 1, TL 2 and TL 4 and opening TL 3 and the whole arrangement is ready for the next operation. If a salvo switch on the Battery Desk is closed, 4 Triple Contact Switches will close at the same time and 4 "Bursts" will be in position to operate when TL 3 closes; otherwise the operation will be the same.

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In order to reduce the effect of line drop which will have considerable effect on the action of the Time Limit Relays, it is desirable to have the voltage for this circuit as high as practicable. The Triple Contact Switches, if made from bussers, must be operated from only one storage cell in order that the coils will not over-heat. The lights may be operated from the A. C. Transformer circuit.

By means of the double-throw switches, A, B, etc., certain desired switches in the Lower Gallery, the instructor may energize all tables when he is there with the [illegible] switch, or he may [illegible] to return to the [illegible]. Lights may be operated by an instructor, from the rotating platform, without operation any of the regular switches and switches on the tables. For this work, contact TL 3 must be short-circuited.

The chart on page 288 shows the wiring diagram for automatic control of the driving motor for the Rotary Range.

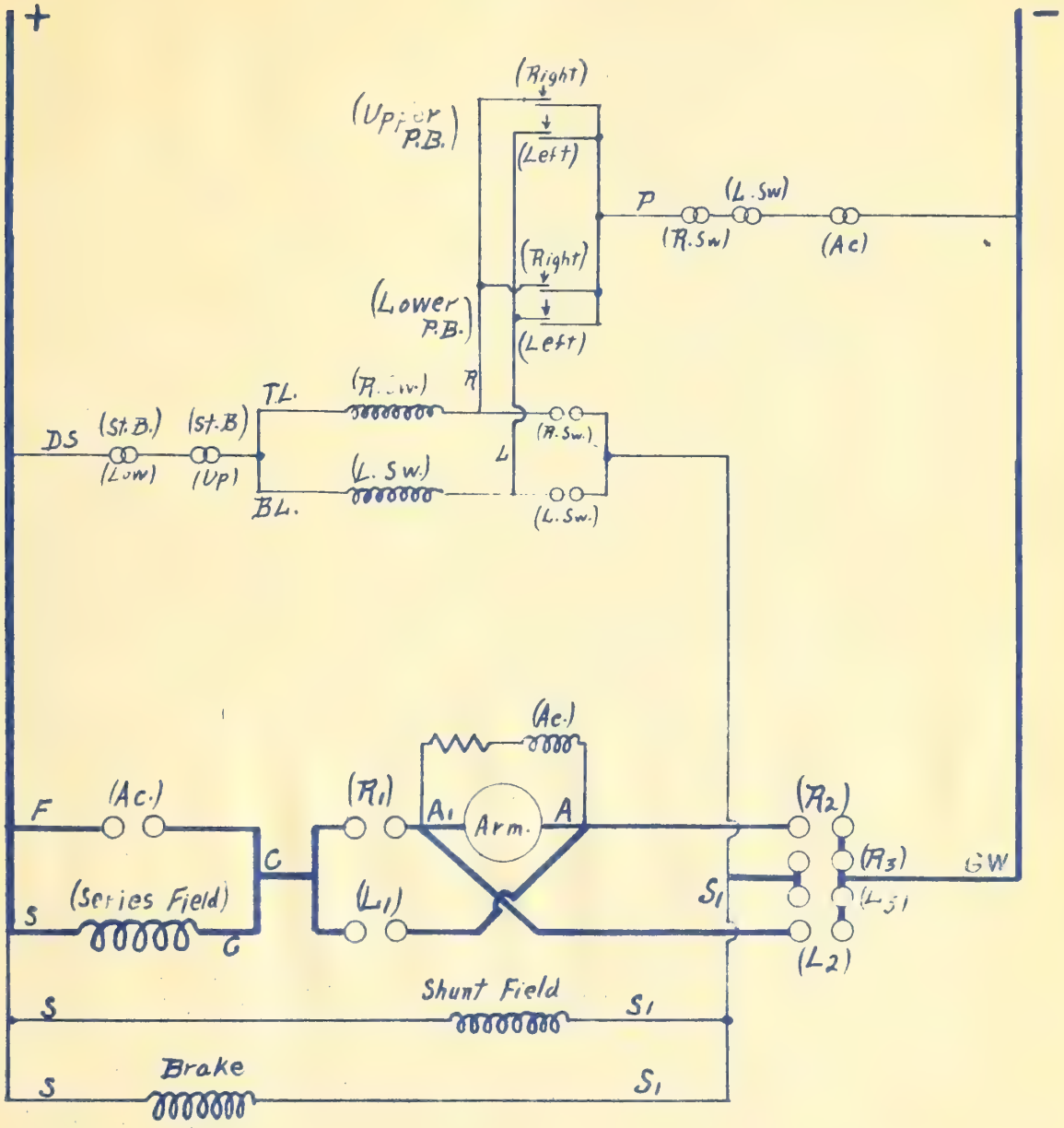
The picture on page 289 shows a sample table with salvo switches. These tables were being installed in the Gunnery [illegible] when the picture was taken. The [illegible] shown [illegible].

For the laboratory work in Map Reading the School used a large [illegible] French and British maps [illegible] the [illegible] operations; also for field work, seventy-two small sketching boards having compasses mounted on them [illegible]. Various models have been used to illustrate the op-

UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

Automatic Control for Driving Motor of Rotary Range.

(Dumb-waiter Control)



R Sw = Right Reversing Switch.
R_1, R_2, R_3 = Main Contacts

L Sw = Left Reversing Switch
L_1, L_2, L_3 = Main Contacts.

P B = Push Button (Making)

St B = Stop Button (Breaking)

Ac = Accelerating Switch (One-point Starter).

Letters refer to studs on control panel.

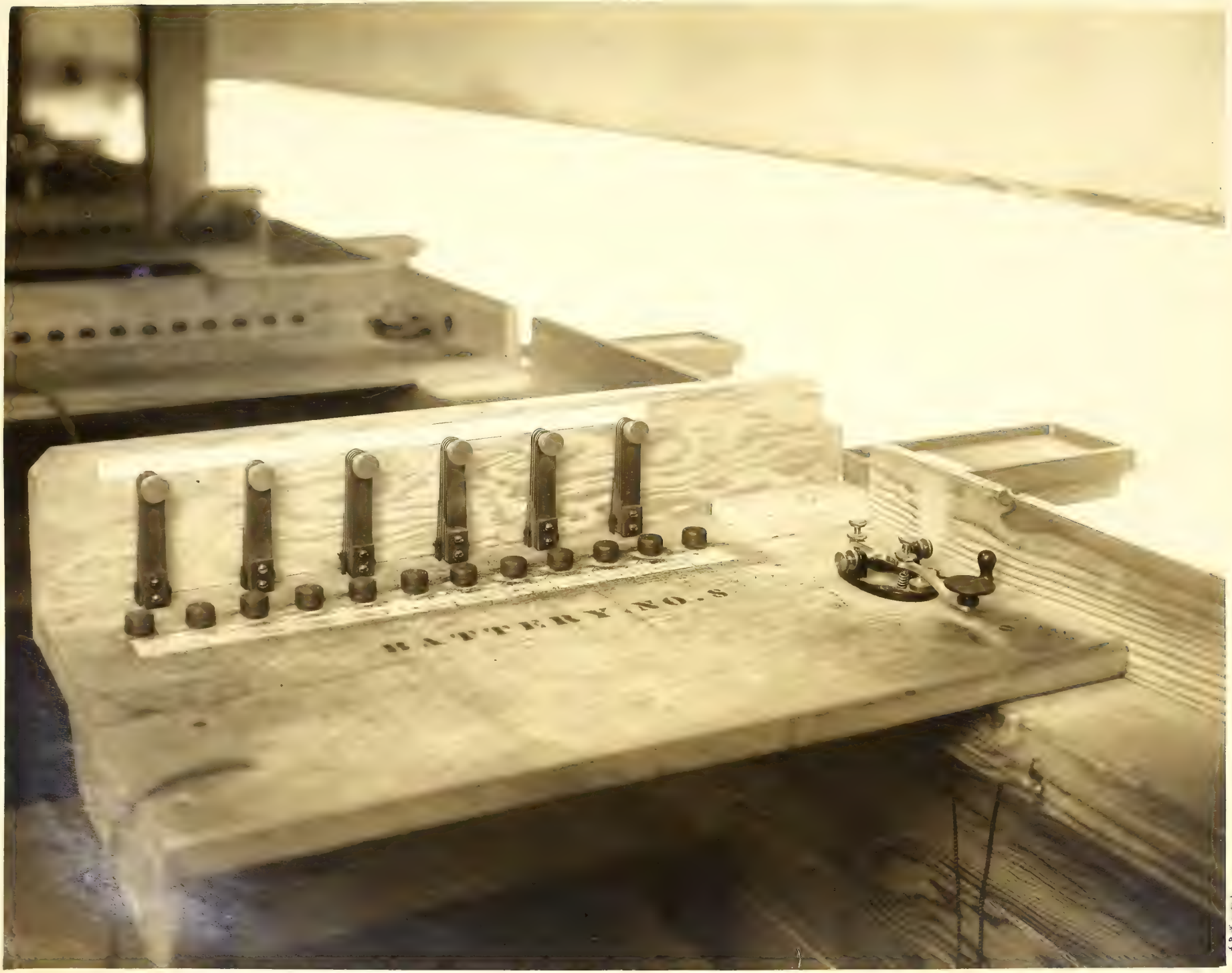

BATTERY NO. 8

Plate No. ~~40~~ 43 - Miniature Range - Salvo Switches - Room 11

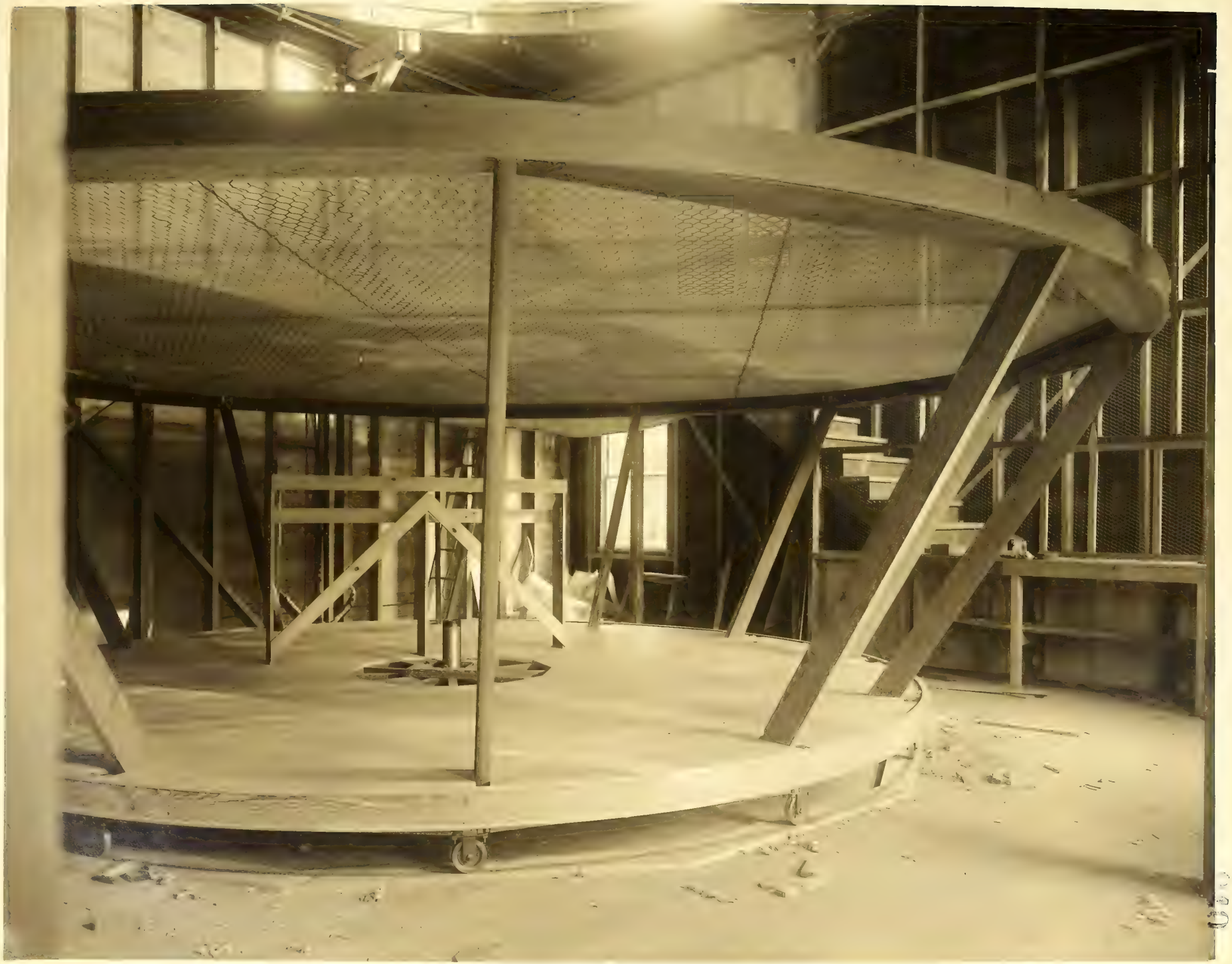


Plate No. ~~41~~ 43 - Rotating Map frome in New Map Building.

eration of the compass and other points of interest in Map Reading. While awaiting final decision as to whether a rotating map was to be constructed, a small map in the form of a strip about 42" wide and several yards long was painted and mounted on parallel rollers. This map has been used for work in orientation, pin pointing and sketching to considerable advantage. This was a temporary expedient only and was abandoned after other equipment was obtained to replace it.

f. Instruction - General. Instruction in the Observation Department, especially the work in Cooperation with Artillery, was based entirely on stencils received from Washington. These stencils have, of course, been revised from time to time as the work on the western front was developed and it was necessary for lectures in this department to be frequently revised. Also the change from the British to the French system of Observation made in January, 1918, called for a complete change in the lectures and method of work on the range. The instruction in this department will be handled briefly under the following heads:

Cooperation with Artillery (Lectures),
Miniature Range,
Map Reading,
Navigation,
Photography,

and other lectures including

Reconnaissance,
Contact Patrol,
Etc.

Cooperation with Artillery (Lectures).

Map Reading.

Reconnaissance.

Etc.

Instruction-Observation.

g. Instruction-Cooperation with Artillery. When the School opened in May, 1917, instruction was given in the British system of cooperation of aircraft with artillery. The curriculum of June 11, 1917, provided four hours lecture on this subject with twelve hours practical laboratory work on the Miniature Range. The curriculum of November 1, 1917, still provided twelve hours laboratory work, but reduced the number of lectures to four.

In January, 1918, the War Department directed the Schools to give instruction in the French system of cooperation of aircraft with artillery, sending through stencials and other literature explaining the method of instruction. Appendix K6 contains the syllabus of the five lectures on cooperation with artillery, which shows in considerable detail the subject matter covered in these lectures. This syllabus is based on the French system of observation, but a large part of it is applicable and was given in the former lectures on the British system of observation. This Appendix also includes a complete write-up of the lectures on cooperation with artillery together with charts used in explanation of the lectures.

h. Instruction-Miniature Range. The earlier eight weeks' curricula all provided twelve hours practical work on the Miniature Range. The twelve weeks' curriculum of April 1, 1918, increased this to sixteen hours. The October 14, 1918, curriculum reduced the work on the range to four hours, although part of the work of Navigation was to have been given on the Range.

The following is a description in some detail of the original Miniature Range installed in Room 14, a copy of the wiring diagram for this Range being furnished on page 243.

The Miniature Range covers an area of 20 feet, by 22 feet. The map is painted on unbleached linen, the scale being 1:600, or 1 foot on the map represents 200 yards on the ground. Accommodation is provided for twenty-six students. Half of these will normally be in the gallery acting as observers, while the other half will be on the floor acting as operators and battery commanders. There are thirteen targets, each of which is equipped with twelve lights. The targets are stationary. Each light is controlled by a separate switch and the switches are arranged in groups on a table which extends around two sides of the range room. The complete set of apparatus for each operator consists of: 12 control switches for the lights, 1 telegraph key with short-circuiting switch, 1 head receiver, 1 signalling lamp, 1 double-throw switch. By means of the double-throw switch the operator can receive messages audibly through the head receiver, or, by throwing over the switch, visually by means of the signalling lamp. The observer's set consists of a telegraph key and a head receiver. In addition to the individual equipment an omnigraph is installed. By throwing in their short-circuiting switches on the telegraph keys, the whole class can listen in and get excellent practice in receiving code. Another feature of the general equipment is a telephone whereby instructions can be given to the whole class. For signalling through head receivers, a 500-cycle pulsating voltage

Instructor-Observer.

c. Instructor-correction with artillery. When the School opened in May, 1917, instruction was given in the British system of cooperation of aircraft with artillery. The curriculum of June 11, 1917, provided four hours lecture on this subject with twelve hours practical laboratory work on the Miniature Range. The curriculum of November 1, 1917, still provided twelve hours laboratory work, but reduced the number of lectures to four.

In January, 1918, the War Department directed the Schools to give instruction in the French system of observation of aircraft with artillery, using Bronze stencils and other literature explaining the method of instruction. Appendix K6 contains the syllabus of the five lectures on cooperation with artillery, which shows in considerable detail the subject matter covered in these lectures. This syllabus is based on the French system of observation, but a large part of it is applicable and was given in the Lecture Course on the British system of correction. This syllabus also includes a complete criticism of the lectures on cooperation with artillery together with charts used in explanation of the lectures.

d. Instructor-Observer course. The earlier sky-map users' courses all provided twelve hours practical work on the Miniature Range. The sky-map users' curriculum of April 1, 1918, increased this to sixteen hours. The October 14, 1918, curriculum reduced the work on the range to four hours, although part of the work of Navigation was to have been given on the Range.

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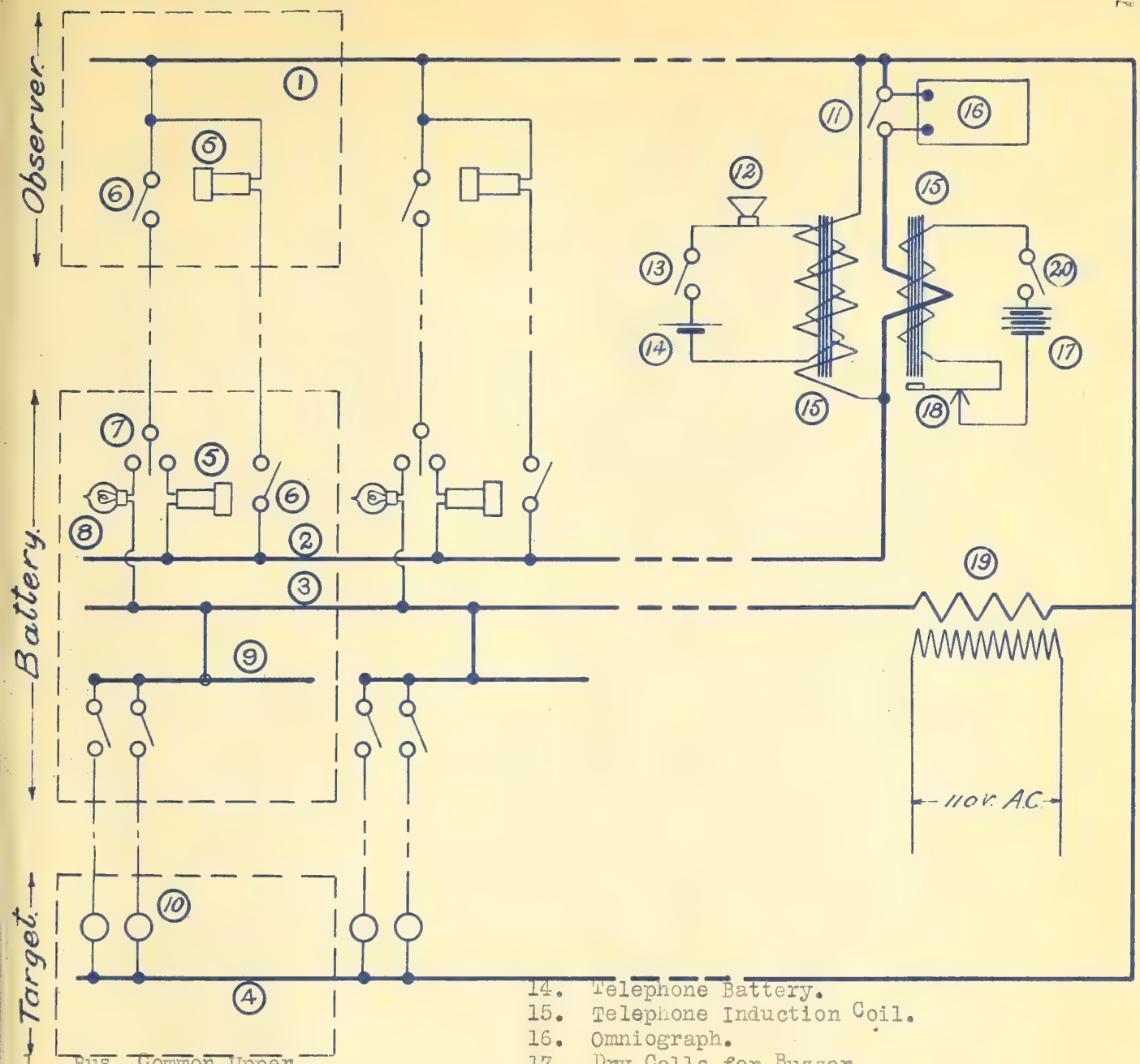
13 Sets.



1. Bus, Common Upper.
2. Bus, Buzzer Lower
3. Bus, Lamp Lower
4. Bus, Return from Target.
5. Head Phone.
6. Telegraph Key.
7. Two-way Switch.
8. Signal Lamp.
9. Bus, Battery Desk.
10. Lights, "Bursts". (6 per Target).
11. Master Telegraph Key.
12. Telephone Transmitter.
13. Switch to connect in Telephone.
14. Telephone Battery.
15. Telephone Induction Coil.
16. Omniograph.
17. Dry Cells for Buzzer.
18. Circuit-breaker for Induction Coil
19. Transformer for lights (6 volt).
20. Switch for buzzer. (Secondary is one turn of #18 wire.)

— WIRING DIAGRAM —

— for —

— MINIATURE RANGE. —

— S.M.A. BERKELEY, CAL. —

END.

Instruction-Observation.

is established between two bus wires. This voltage is obtained by passing one term of #18 wire around a #5 Western Electric Induction Coil, fitted with a #101495 Interrupter. A diagram of connections is furnished on the following page. One turn of wire around the coil has been found to give the best results. On account of the low inductance of this secondary no appreciable difference in the tone in the receivers can be noticed when one receives alone, or a twenty-six in parallel, are in operation. The signalling lamps and those in the targets are operated from the secondary of a 110 - 6 volt transformer. The lamps appear to hold up very well with alternating current, none having had to be replaced yet. In parallel with the omnigraph is a master telegraph key. This is used when the instructor gives his demonstration of a pre-arranged shoot to the class.

In order to distinguish the lights on the different targets, they are colored red, green, blue and yellow. A three-quarter inch hole was drilled through the floor for each light. Over the hole, and between the map and the floor, is a thin metal diaphram with a number cut in it. When the light is turned on the number shows up clearly from the gallery above. These numbers are used in pin-pointing and do away with the necessity of disfiguring the map with pieces of paper or flags. The different colored lights are also useful in the exercise on reporting new targets.

Some of the advantages of the fixed target as compared with the movable target are as follows:

In the first place it is possible to have a greater number in operation at one time on a map in a given area. We have thirteen targets on a map 20 ft. by 22 ft. No confusion arises as to which lights belong to the different targets as they are colored differently. Each pair of students can thus work on a separate target.

As there are twelve lights on each, the students do not have time to learn the clock-codes for each light by heart. The switches can all be marked with the correct clock-code and the students can correct each other. Every man is kept busy all the time and each pair works independently of the others. This is a very desirable feature as good men are not held back by poorer ones. The instructor allows the men to arrange themselves in pairs.

The system of signalling through receivers in place of buzzers is a marked imppovement. The noise of twenty-six buzzers operating together was unbearable, and the men found great difficulty in picking out their messages. The note produced in the receivers by the scheme developed here bears a very close resemblance to that actually heard in a wireless set.

The work done under the British system on the range is outlined in considerable detail in the following statement on this work.

PRACTICAL WORK ON MINIATURE RANGE.

The total time spent on the range by each student is 12 hours. Of this, ten hours are devoted to practice and two hours to examination. The practical work is divided into five exercises, the nature of, and the time devoted to each being explained below. It has been suggested that the laboratory periods are too long and that more efficient work could be done if these periods were limited to one hour at the outside. I am heartily in accord with this suggestion and will re-arrange the work on this basis.

[illegible] - Instruction.

[illegible] between two [illegible]. [illegible] of [illegible] and [illegible] found a #5 Western Electric Induction Coil, fitted with a #101485 [illegible]. A diagram of connections is furnished on the following page. One turn [illegible] coil [illegible] found to give [illegible] results. [illegible] low inductance circuits [illegible] [illegible] clavis can be worked [illegible] [illegible] operation. The signalling range [illegible] secondary of a 110 - 6 volt transformer. The lamps appear to hold up very well with alternating current, none having had to be replaced yet. In parallel with the [illegible] demonstration of a pre-arranged shoot to the class.

In order to distinguish the lights on the different targets, they are coloured red, green, blue and yellow. A three-quarter inch hole was drilled through the floor for each light. Over the hole, and between the map and the floor, is a thin metal [illegible] with a number cut in it. When the light is turned on the number shows up clearly from the gallery above. These numbers are used in pin-pointing and do away with the necessity of distinguishing the map with pieces of paper or flags. The different coloured lights are also useful in the exercise on reporting new targets.

Some of the advantages of the fixed target as compared with the movable [illegible] yet are as follows:

In the first place it is possible to have a greater number in operation [illegible] one time on a map in a given area. We have thirteen targets on a [illegible] 40 ft. by 22 ft. No confusion arises as to which lights belong to the [illegible] they are coloured differently. Each pair of students [illegible]

As there are twelve lights on each, the students [illegible] the floor-code for each light by heart. The switches can [illegible] correct clock-code and the students can correct each other. Every [illegible] all the time and each air works independently of the others. This is a very desirable feature as good men are not held back by poorer ones. The instructor allows the men to arrange themselves in pairs.

The system of signalling through receivers in place of buzzers is a marked improvement. The noise of twenty-six buzzers operating together was unbearable, and the men found great difficulty in picking out their messages. The note produced in the receivers by the scheme developed here bears a very close resemblance to that actually heard in a wireless set.

The work done under the British system on the range is outlined in considerable detail in the following statement on this work.

[illegible]

The total time spent on the range by each student is 12 hours. Of this, ten hours are devoted to practice and two hours to examination. The practical work [illegible] explained below. It has been suggested that the laboratory periods are too long and [illegible]. I am heartily in accord with this suggestion and will re-arrange the work [illegible].

Instruction-Observation.

Exercise I. PIN-POINTING. Time 1 hour.

Squadron "G" Section I. Monday, 8.10 a.m. - 9.00 a.m.
Section II. Monday, 10.10 a.m.-11.00 a.m.

Fifty lights in the map are turned on, each appearing as an illuminated number. The students are sent up to the gallery with their maps and are required to determine the pin-points and to write them down. A latitude of one-tenth in each co-ordinate is allowed. Thus, if the correct pin-point is H 3 c 5 6 and the student reads it as H 3 c 5 7 or H 3 c 4 6, this is considered sufficiently accurate. If, however, he reads the pin-point as H 3 c 5 8, this is marked wrong.

The average student will read and record about thirty correct points in the hour.

Exercise II. PIN-POINTING AND SIGNALLING. Time 2 hours.

Squadron "H". Section I. Tuesday, 10.10 a.m. - 12.00 m.
Section II. Tuesday, 2.10 p.m. - 4.00 p.m.

The section is paired off, one man of each pair being sent to the gallery to act as "observer" while the other man remains on the floor to act as "Operator". The observers determines pin-points from their maps as in Exercise I. and telegraphs them down to the operator. The latter repeats the message to his observer. If correct, the observer signals "O.K" and proceeds to the next point. If incorrect, the observer repeats the message. This gives both men practice in sending and receiving code and is excellent preparation for Exercise III. At the end of the first hour the men change places, first handing in their records to the instructor. These records are checked to see that messages conform and that points have been correctly determined.

Exercise III. ARTILLERY PATROL. REPORTING NEW TARGETS. Time 2 hours.

Squadron "H". Section I. Wednesday, 8.10 a.m. - 10.00 a.m.
Section II. Wednesday, 2.10 p.m. - 4.00 p.m.

The section is paired off as in Exercise II. Twenty-five colored lights are exposed on the map, the different colors representing targets of different descriptions according to a code. A red light represents "an active hostile battery", a green light represents "silent hostile battery", etc. The observer locates the target by pin-pointing the light and telegraphs the message to the operator, the complete message including: (a) the zone call, (b) the nature of the target, (c) the pin-point of the target, (d) the target number, (if the target is discovered in the observer's zones.) The operator repeats the messages as a check.

The average student will report about 15 targets correctly in the hour.

Instruction-Observation

Exercise IV. CLOCK-CODE. Time 2 hours.

Squadron "H". Section I. Thursday, 10.10 a.m. - 12.00 a.m.
Section II. Thurday 2.10 p.m. - 4.00 p.m.

The section is paired off, each pair being detailed to work on a separate target. Our map is equipped with 13 targets so that we can accommodate a section of 26 men. The targets are clearly marked by leaving the "O.K" light burning on each. It has been found advisable to have the targets marked for the first exercise in clock-coding, but in all succeeding exercises the targets are not visible. The operators on the ground work the lights on the targets while the observers telegraph down the clock-code corrections to them. Each light switch is marked with the correct clock-code pertaining to it. If the observer sends the wrong correction, the operator again flashes the light and the observer tries again. The lights are visible normally for three seconds only. Each pair of students works on one target for ten minutes after which time the pair moves to the next target for ten minutes after which time the pair moves to the next target. This prevents the possibility of memorizing.

Exercise V. PRE-ARRANGED SHOOT. Time 3 hours.

Squadron "H" Section I. Friday, 8.10 a.m. - 11.00 a.m.
Section II. Friday, 1.10 p.m. - 4.00 p.m.

The sections are divided into groups of three men. Each group works with two targets. One man acts as observer and the other two as operators and battery commanders. Two adjacent communicating sets are connected together so as to enable the observer to signal to the two operators simultaneiously. Each group is given a "Squadron call" and the observer ranges two batteries on two targets, the operators distinguishing the messages concerning them by the battery letter in the squadron call. Replies from the men on the floor are sent by miniature ground strips. At the end of each hour a switch is made so that each man has a turn as observer.

When the change was made from the British to the French system of observation in January, 1918, the method of observation on the Miniature Range was materially changed. The syllabus on miniature artillery observation range and a typical example of the pre-arranged shoot included in Appendix K6 outlines the work done under the French system in much detail and also includes rules of conduct on the range which were considered necessary by the staff of the Observation Department. Appendix K6 also includes a card of code signals arranged by the Observation Department for use in the work on the range.

i. Map Reading. Under the early eight weeks' curriculum, only four hours were devoted to map reading. When the curriculum was revised on November 1, 1918, map reading was transferred to the Aids to Flight Department, the time devoted to it being increased to eight hours. In the twelve weeks' curriculum of April 1, 1918,

[illegible]

[illegible]. CLOCK-CODE. Time 2 hours.

Squadron "H". Section I. Thursday, 10.10 a.m. - 12.00 a.m.
Section II. Thursday 2.10 p.m. - 4.00 p.m.

The section is paired off, each pair being detailed to work on a separate [illegible]. [illegible] of 36 men. The targets are clearly marked by leaving the "O.K." light burning on each. It has been found advisable to have the targets marked for the first exercise in clock-coding, but in all succeeding exercises the targets are not visible. The operators on the ground work the lights on the targets while the observers telegraph down the clock-code corrections to them. Each light switch is marked with the [illegible]. [illegible] the operator again fixes the light and the observer tries again. The lights are [illegible] for ten minutes after which time the pair moves to the next target for ten minutes after which time the pair moves to the next target. This prevents the possibility of memorizing.

[illegible]. [illegible]. Time 3 hours.

Squadron "H" Section I. Friday, 8.10 a.m. - 11.00 a.m.
[illegible]

The sections are divided into groups of three men. Each group works with two targets. One man acts as observer and the other two as operators and battery commanders. Two adjacent communicating sets are connected together so as to enable the observer to signal to the two operators simultaneously. Each group is given a "squadron call" and the observer ranges two batteries on two targets, the operators distinguishing the messages concerning them by the battery letter in the squadron call. Replies from the men on the floor are sent by miniature ground strips. At the end of each hour a switch is made so that each man has a turn as observer.

When the change was made from the British to the French system of observa- [illegible] of the pre-arranged shoot included in Appendix K6 outlines the work done under the French system in much detail and also includes rules of conduct on the range which [illegible] in the work on the range.

1. Map Reading. Under the early eight weeks' curriculum, only four hours were devoted to map reading. When the curriculum was revised on November 1, 1918, [illegible] being increased to eight hours. In the twelve weeks' curriculum of April 1, 1918,

Instruction-Observation

map reading was again transferred to the Observation Department, sixteen hours being devoted to the subject in the twelve weeks' curriculum. In the twelve weeks' curriculum of October 14, 1918, the time devoted to map reading was again increased to eighteen hours. Copies of the syllabus on map reading which was furnished to each cadet attached in Appendix K6 outlines in considerable detail the work given in this subject. Under the twelve weeks' curricula of April 1, 1918 and October 14, 1918, part of the work in map reading was to have been given on the rotating map as outlined in the stencils covering the above curricula. Inasmuch as the rotating map was never completed, work of a nature similar to that called for was given on a number of small French maps which had been furnished to the School by the War Department.

j. Navigation. Navigation first appeared in the curriculum of October 14, 1918, fifteen hours being devoted to this subject. The work required is outlined in much detail in Stencil No. 272. The work was followed as there outlined except that substitution had to be made for the time called for on the rotating map, inasmuch as the rotating map was never completed.

k. Photography. Lectures on Photography varying in number from three to six have always been included in the curricula of the Observation Department. A brief syllabus outlining the work given in this subject is included in Appendix K6. The curriculum of October 14, 1918 provided an extensive course in Photographic Interpretation, calling for thirty-eight hours for Observers and eighteen hours for Pilots and Bombers. Special equipment was to have been provided for this course and the War Department expected to send additional equipment and instructors to handle the work. Due to the signing of the armistice, however, the work in Photographic Interpretation was entirely eliminated.

l. Reconnaissance and Contact Patrol. From two to four lectures on Reconnaissance and one lecture on Contact Patrol were included in the eight weeks' curricula These subjects were dropped in the twelve weeks' curricula of 1918. The lectures followed stencils and subject matter furnished by the War Department, but no syllabus on the course was ever prepared.

m. Bombing. Instruction in bombing, if included in the curricula at all was always included in the Gunnery Department until the curriculum of October 14, 1918 was issued. This curriculum provided a course for bombers which included nine hours instruction on bombing in the Observation Department. A special traveling carpet was to have been installed, but due to the signing of the armistice, this work was eliminated and no bombers were graduated from this School.

n. Examinations. Examinations in the Observation Department have always been given along the lines laid down in the curricula. The final examination has always included a written examination and a practical examination on the Miniature Range. Some questions as given in the written examination are included on the following pages. The practical examination on the Range covered work outlined in the syllabus in Appendix K6

Final Examination in AERIAL OBSERVATION.

Squadron H-40. Apr. 25, 1918.

1. Name the three types of field artillery and the seven main characteristics in which they differ.

2. (a) A French "75" is 3750 mm. long. What is its length in calibers?
(b) Its 50% zone at a range of 10,000 m. is found to measure 50 m. How long, then, is its 100% zone for the same range and setting?

3. Beginning at the left, the four shots of a salvo fall so that their individual errors are: (1) 50 m. left, 300 m. over; (2) 25 m. left, 50 m. short; (3) at intersection of B-T line and target line; (4) 50 m. right, 150 m. over; all referred to intersection of axes.
(a) What would be the correct report on this salvo, in code, if the right of the target were 50 m. to the right of the B-T line?
(b) Considering the third shot (3) as a single burst, what would be the correction with reference to the center of the target?

4. (a) Why call the wireless station at your aerodrome on starting to a salvo shoot?
(b) Within what distance from your battery aerial should you avoid sending wireless messages. Why?

5. What is the most important means of signalling position:-
(a) From the infantry to its airplane?
(b) In the opposite direction on a sunny day?

6. Name four typesof reconnaissance and describe fully one of them.

7. Give an outline of the general form used in taking notes while on a reconnaissance flight.

8. (a) Are plates or films superior in air photography?
(b) Name three types or classes of air photographs.

9. Pictures overlapping 1 in. are to be taken with a lens of 8 in. focal length and 4x5 in. plates, flying 50 miles per hour at an elevation of 8800 ft., the 5 in. side of the plate parallel to the lane of flight. (a) Qhat area on the ground, in square feet, appearing on the first plate, will also be shown on the second. (b) What time in seconds shouldbe allowed to elapse between snaps?

10. What are the three functions of the plate sheath used in the British Model "C" camera?

1. Name the three types of field artillery and the seven main characteristics in which they differ.

2. (a) A French "75" is 3750 mm. long. What is its length in calibers?
(b) The 105 mm. has a range of 10,000 m. at an angle of 30°. What, in mm., is its 100% zone for the same range and setting?

3. Estimate or time, from your tent or a nearby hill, the following errors are: (1) 50 m. left, 300 m. over; (2) 25 m. left, 50 m. short; (3) at intersection of B-T line and target line; (4) 50 m. right, 150 m. over; all referred to intersection of axes.
(a) What would be the actual range on this mission, if the target were 3000 m. in the rear of the T-T line?
(b) How would you fire (1) on a single target, (2) on a single target, (3) on the intersection, (4) on the center of the target?

4. (a) Why call the wireless station at your aerodrome on starting to a salvo shoot?
(b) Within what distance from your battery certain should you avoid using wireless messages. Why?

5. What is the most important means of signalling position:-
(a) From the infantry to its airplane?
(b) In the opposite direction on a sunny day?

6. Name four types of reconnaissance and describe fully one of them.

7. Give an outline of the general form used in taking notes while on a reconnaissance flight.

8. (a) Are plates or films superior in air photography?
(b) Name three types or classes of air photographs.

9. Interval photography I am over to be taken with a lens of 6 in. focal length and 4x5 in. plates, flying 60 miles per hour at an elevation of 8800 ft., the 5 in. side of the plate parallel to the line of flight. (a) What area on the ground is covered by each exposure? (b) What time in seconds should be allowed to elapse between snaps?

10. What are the three questions of the radio [illegible] in the [illegible] "at sunset"

Final Examination, DEPARTMENT OF OBSERVATION.

Squadron M-49. July 18, 1918.

1. Your Machine has an average rate of flight of 80 miles per hour. Construct a scale of minutes for an R.F. of 1/190,000.

2. Explain, in detail, four different methods of orienting a map, choosing your own conditions in each case.

3. Define, "Contour lines", "map distance", "magnetic bearing", "true meridian" and "topographic map".

4. Construct a "map distance" scale for a map reading from $\frac{1}{2}^{\circ}$ to 5°. Contour interval is 50 ft. Scale is 1" = 1 mile.

5. (a) If you were instructed to make a rough sketch of anarea five miles square, not of enemy territory, and had at your disposal any unit of measuring distance you cared to use, the territory being rather flat, even country, what would you choose and why?

(b) Would you choose a relatively large or relatively small contour interval? State your reasons in full.

6. Which type of piece is most effective
(a) For firing on the reverse slop of a nearby high ridge?
(b) For firing shrapnel?
(c) For firing on barbed-wire entanglements?
(d) For long-range fire on a casemated-battered?
(e) For long-range fire on a vertical target?

7. (a) What would you estimate the length of a given weapon to be, if you saw it firing fixed ammunition 105 mm. in diamater? (Show calculations.)

(b) Assuming you had but one weight of powder charge to use in a mortar and that with this weight of charge and at an elevation of 45° your shells were falling slightly beyond your target, could you make a hit without lowering the muzzle? (Give reasons).

8. Assuming all artillery observers during fire for final adjustment (amelioration) called simultaneously for fire from their batteries,

(a) How many projectiles would be fired by all the guns of the first Division in a French Army Corps between the first and second signals to fire?

(b) Compare the number required by all divisional guns in the corps between signals to fire during preliminary adjustment.

9. Name and describe the best means of signalling from the ground to the observer:
(a) "Your wireless works, but signals confused; repeat".
(b) "Locate battery firing on balloom 98!" (On a sunny day).

10. (a) Name five features that may distinguish a railroad from a road, in a vertical photograph.

(b) When might a real trench photograph be the same as a dummy trench?

July 18, 1918.

1. Your landing for an average rate of flight of 80 miles per hour. Construct a scale of minutes for use in it. of 1/190,000.

2. Explain, in detail, the different methods of indicating a map, according your conditions in use.

3. Define, "Contour lines", "map distance", "magnetic bearing", "true meridian" and "Geographic mer".

4. Construct a "map distance" scale for a map reading from 0" to 8". Contour interval is 50 ft. Scale is 1" = 1 mile.

5. (a) If you were instructed to make a rough sketch of areas five miles square, at 2 miles distance, and at 4 miles distance, what would you choose and why?
(b) Would you choose a relatively large or relatively small contour interval? State your reasons in full.

6. Which type of piece is most effective
(a) For firing on the reverse slop of a nearby high ridge?
(b) For firing sharpnell?
(c) For firing on barbed-wire entanglements?
(d) For long-range fire on a casemated-battered?
(e) For long-range fire on a vertical target?

7. (a) What would you estimate the length of a given weapon to be, if you saw it firing from emplacement 1000 m. in diameter. (Show calculations).
(b) Assuming you had the car weight, 7 inches range to be 12 m. [illegible] same weight, [illegible] Pulling 1/10th of your weight, would you [illegible] a 1000 yd. [illegible] range? (Give reasons).

8. Assuming all artillery observers during fire for final adjustment (ameliorations called simultaneously for fire from their batteries.
(b) Compare the number required by all divisional guns in the corps [illegible] [illegible] for the barrage preliminary [illegible].

9. [illegible] the best means of signalling from the ground to the observer:
(a) "Fire [illegible], but signal [illegible] range".
(b) "Locate battery firing on balloon 98!" (On a sunny day).

10. (a) Name five features that may distinguish a railroad from a road, in a vertical photograph.
(b) When might a real trench photograph be the same as a dummy trench?

Squad. M-62. Final Examination, OBSERVATION. Oct. 24, 1918.

1. (a) The distance between two villages on the map is 9 inches. If the R. F. of the Map is 1/200,000, what is the actual distance in kilometers on the ground?
(b) What is the distance in miles between these two villages?

2. State three different methods of orienting a map and name the conditions in each case.

3. Define the following terms: (a) Contour lines,
(b) True meridian,
(c) Map distance,
(d) Contour interval.

4. Illustrate, by the use of contour lines,- A large flat plateau which has a small saddle on one end and a depression on the other end. On one side, the plateau ends in a vertical cliff and on the other side in an overhanging cliff. On one end it ends in a convex slope and on the other end in a concave slope. A watercourse and a watershed are to be represented on the plateau.

5. Discuss the effect of wind drift upon the "track" or path of an airplane with respect to the ground. How, in general, is the wind drift error allowed for?

6. (a) A certain piece has a length of 10.4 meters and fires a certain projectile with any one of five different powder charges. What is the probable caliber of the piece?
(b) Assuming that the rifling at the muzzle has a pitch of one turn in 25 calibers of length and that the projectile has a slip of 25% with reference to this rifling as it leaves the muzzle, what will be the rotational speed of the projectile at this point? Show all work and underline answers called for.

7. (a) What is the "Error of the Day"? Give the causes, the effect of each and tell how the error is corrected for.
(b) What is the "Error of the Moment"?

8. (a) Give the following with meanings:-
1. Two Service Signals,
2. Two Ground Strip Signals,
3. Two signals from the Two-numeral Group,
4. Two signals from the Two-letter Group.
5. Two signals from the Three-numeral Group.
(b) Suppose that a battery is equipped with a panneaux instead of ground strips, how would the ground strip messages on the back of your code card be sent? Give one example.

9. Draw a diagram showing the general course of flight taken up by the observer during a prearranged shoot, with other things necessary to show the procedure. Tell where each message would be sent, received and acknowledged from the time the observer leaves the aerodrome until he sends the first correction in the preliminary adjustment.

(b) What is the distance in miles between these two villages?

3. Define the following terms: (a) Contour lines,
(c) Map distance,
(d) Contour interval.

4. Illustrate, by the use of contour lines,- A large flat plateau which has a small saddle on one end and a depression on the other end. On one side, the plateau ends in a vertical cliff and on the other side in an overhanging cliff. On one end it ends in a convex slope and on the other end in a concave slope. A watercourse and a watershed are to be represented on the plateau.

5. Discuss the effect of wind drift upon the "track" or path of an airplane with respect to the ground. How, in general, is the wind drift error allowed for?

with any one of five different powder charges. What is the probable caliber of the piece?
(b) Assuming that the rifling at the muzzle has a pitch of one turn in 25

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8. (a) Give the following with meanings:-

3. Two signals from the Two-numeral Group,
4. Two signals from the Two-letter Group.
5. Two signals from the Three-numeral Group.

(b) Suppose that a battery is equipped with a pennaux instead of ground strips, how would the ground strip messages on the back of your code card be sent? Give one example.

9. Draw a diagram showing the general course of flight taken up by the observer during a prearranged shoot, with other things necessary to show the procedure. Tell where each [illegible] the time the observer leaves the aerodrome until he sends the first correction in the preliminary adjustment.

10. (a) Describe briefly the appearance of the following objects in an aerial photograph:

(1) Barbed wire,
(2) Dug-outs,
(3) Burried cables across a plowed field.

(b) Why are stereoscopic photographs used?

Instruction - Aids to Flight.

13. Aids to Flight Department.

The Aids to Flight Department was started in the curriculum of September 26, 1917, and continued in the curriculum of November 1, 1917. Under the latter date this Department included the following subjects:

Theory of Flight	4 hours
Cross Country Flying	2 "
Map Reading	8 "
Meteorology	3 "
Night Flying	2 "
Instruments and Compasses	3 "
Examination	2 "
Total	24 hours.

The Department was formed because of the unsatisfactory division of departments under the curriculum of June 11, 1917. It did not prove satisfactory, however, to have the subjects grouped as they were in the November 1, 1917, curriculum and when the curriculum was again revised on March 1, 1918, the Aids to Flight Department was eliminated, the work being absorbed in the Airplanes and Observation Departments.

The first head of the Department was Mr. J. A. Polhemus, who served in this capacity until December, 1917, when he left the school for other service. Mr. G. M. Thomas was then appointed head of the Department, serving in this capacity until the department was eliminated. In Appendix II is furnished a complete list of the instructors who served in this Department. The description of the work included in the Aids to Flight Department is covered in the write-ups on the Airplanes and Observation Departments and need not be gone into further at this point. Sample sets of examination questions given in this Department are included in the following pages.

FINAL EXAMINATION, AIDS TO FLIGHT. SQUADRON H-21

November 27, 1917.

1. Discuss the center of pressure movement for both flat and curved surfaces.

2. What stability have we about the lateral axis and how is it maintained?

3. You have a complete and properly constructed map of a section of country to use for the first time. What steps would you take to become thoroughly familiar with the map before starting to use it in the field?

4. You are placed in a strange country with a map which has neither true nor magnetic north marked on it and you have no compass. What three steps would you take to make the map of most service to you and explain briefly how you would accomplish each step.

5. (a) Construct to the scale of your map of Belgium a sketch representing an area 3000 yards square. Mark the exact length in inches of one side of the sketch.

(b) Use conventional signs to represent the following objects on this sketch: First-class fenced road; enemy trench with wire entanglements; a mill; and orchard; a cut and a fill on the road. (Label the signs).

(c) Define a contour line and tell for what purposes contour lines are used.

6. Discuss: (a) What conditions should be seen to in selecting a place for a compass on an aeroplane?

(b) What are deviations and how are they dealt with?

(c) How can a compass be adjusted so as to read geographic directions instead of magnetic?

7. Briefly show the characteristics of (a) a thunderstorm, (b) a line squall, (c) a cyclone.

8. (a) Show in detail how you would locate the North Star.

(b) How would you use the planets in steering a course? Why should the use of planets be, in general, avoided?

9. (a) It is 90 miles frompoint A to point B. In still air a machine can make this trip in one hour. With a 20 MPH wind blowing from A toward B: (1) What is the air speed of the machine flying from A to B? (2) Its ground speed from A to B? (3) Air speed from B to A? (Return trip) (4) Ground speed from B to A?

10. (a) Discuss procedure immediately before a C.C. flight.

(b) Give two reasons for stowing miscellaneous equipment, (such as tool kit, engine cover, etc) securely before starting a C.C. flight.

(c) Describe day and night landing signals, and show how they indicate the direction of the wind.

[illegible] Examination, Area [illegible] [illegible]. [illegible] 1-2:

[illegible] 21, 1[illegible].

1. Discuss the center of pressure movement for both flat and curved surfaces.

2. [illegible] stability [illegible] the lateral axis [illegible]?

3. [illegible] a complete and properly constructed map of a section of country to use for the first time. What steps would you take to become thoroughly familiar with the map before starting to use it in the field?

4. You are placed in a strange country with a map which has neither true nor [illegible] [illegible]. [illegible] take to make the map of most service to you and explain briefly how you would accomplish [illegible].

5. (a) Construct to the scale of your map of Belgium a sketch representing an area 3000 yards square. Mark the exact length in inches of one side of the sketch.
(b) Use conventional signs to represent the following objects on this sketch: First-class fenced road; enemy trench with wire entanglements; a mill; and orchard; a cut and a fill on the road. (Label the signs).
(c) [illegible] [illegible] [illegible].

6. [illegible] to in selecting a place for [illegible] an aerodrome?
(b) What are deviations and how are they dealt [illegible]
[illegible]

7. Briefly show the [illegible] (a) a thunderstorm, [illegible] a line squall, (c) a cyclone.

8. (a) Show in detail how you would locate the North Star.
(b) How would you use the planets in steering a course? Why should the use of planets be, in general, avoided?

9. (a) It is 90 miles from point A to point B. In still air a machine can make this trip in one hour. With a 20 MPH wind blowing from A toward B: (1) What is the air speed of the machine flying from A to B? (2) Its ground speed from A to B? (3) Air speed from B to A? (Return trip) (4) Ground speed from B to A?

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(c) Describe day and night landing signals, and show how they indicate the direction of the wind.

FINAL EXAMINATION: AIDS TO FLIGHT. SQUADRON H-25

Tuesday, January 8, 1918.

1. What effect has the aspect ratio on the efficiency or L/D ratio of a wing?

2. Is a monoplane arrangement of lifting surface more or less efficient aerodynamically than a biplane arrangement? Why?

3. (a) What are the four elements of Map Reading?
(b) Discuss each briefly.

4. Draw a sketch using at least 10 conventional signs used on your map of Belgium. (Label the signs.)

5. (a) Define contour interval.
(b) Give four characteristics or principles of contours which would enable you to read the relief of the earth's surface from a contour map.

6. (a) Make a diagram showing the construction of the Aneroid Barometer.
(b) Show the importance of, and the means of elimination of, the three errors to which the instrument is subject.

7. (a) Show on a diagram the following: Cyclone, Secondary depression, "V" shaped depression, and Wedge. Show also the winds about the cyclone, and general variety of weather.
(b) Why does the cyclone move east?

8. An aviator noticed, on June 21, that he was flying so that the rising sun was to his left. What was the azimuth of his course?

9. You are to fly from A to B - a distance of 100 miles. In still air your machine could make this trip in one hour. A 30 MPH wind is blowing from B to A. Give (1) the air speed of the machine.
(2) the ground speed of the machine.
(b) Taking above conditions what flight height would you choose in flying from A to B? What flight height returning? (B to A)

10. (a) Give three reasons for circling around your own aerodrome before starting on a Cross Country flight.
(b) What two common errors in judgement are likely to cause a pilot to make a bad landing at night?

[illegible] AIDS TO FLIGHT. [illegible]

[illegible], January 2, 1[illegible].

1. [illegible] effect has the aspect ratio on the efficiency or L/D ratio of a wing?

2. Is a monoplane arrangement of lifting surfaces more or less efficient aerodynamically than a biplane arrangement? Why?

3. (a) What are the four elements of Map Reading?
(b) Discuss each briefly.

4. [illegible] a section drawn at least 10 conventional signs seen on your map of Belgium. (Label the signs.)

5. (a) Define contour interval.
(b) Give four characteristics or principles of contours which would enable you to read the relief of the earth's surface from a contour map.

6. (a) [illegible] a diagram showing the combination of two [illegible].
(b) Show the [illegible] of, and the means of [illegible], the three [illegible] to which the [illegible] is subject.

7. (a) Show on a diagram the following: Cyclone, secondary depression, "V" shaped depression, and Ridge. Show also the winds about the cyclone, and [illegible] [illegible] in [illegible].
(b) [illegible] the [illegible] over [illegible]?

8. An aviator noticed, on June 21, that he was flying so that the rising sun was to his left. What was the azimuth of his course?

9. [illegible] to fly from [illegible] to [illegible] - a distance of 240 miles. In still air [illegible] machine could make this trip in one hour. A 30 MPH wind is blowing from 2 to 4. Find (1) the air speed of the machine.
(2) the ground speed of the machine.
(3) [illegible] conditions what [illegible] would [illegible] to [illegible] [illegible] (2 to 4)

10. (a) Give three reasons for circling around your own aerodrome before starting on a Cross Country flight.
(b) What two common errors in judgement are likely to cause a pilot to make a bad landing at night?

Instruction - Drill and Discipline Department.

14. DRILL AND DISCIPLINE DEPARTMENT.

a. General. Instruction in drill and discipline was one of the most important branches of the work in this school. This school was, in effect, a training camp for officers, and knowledge of drill and proper attitude were absolutely essential in the construction of future officers. The subject of discipline has been emphasized very much by the Commandant at this institution, and many changes have been made from time to time and formal ceremonies added, all with the idea of improving the discipline of the school.

Originally, instruction in drill and discipline was handled by the head of the Military Subjects Department, under the supervision of the Commandant. Later as the size of the school increased, and as the number of hours of theoretical instruction in Military Subjects increased, a new department was organized at this school to handle the practical work in drill and to emphasize the question of discipline more strongly. This department was originally known as the Practical Military and Discipline Department. Shortly after its organization, however, the name was changed to the Drill and Discipline Department.

b. Staff. Captain Crane (now Major Crane) was the first head of the Practical Military and Discipline Department in January, 1918. Under him, Lieutenant Reed was made head of the Drill section, and Lieutenant Pillsbury head of the Barracks section. The two latter officers had their offices at the barracks and an officer was constantly on duty at the barracks to assist in the proper maintenance of discipline. When Captain Crane was appointed Adjutant of the school, Lieutenant Reed was appointed head of the Drill and Discipline Department, serving in that capacity until he was transferred. Lieutenant Price was then made head of the Department for a few months, when he was replaced by Lieutenant Wilkinson. The staff of the Drill and Discipline Department during the later months of the school was composed entirely of commissioned officers, although during the earlier months civilian instructors were used on the drill field inasmuch as there were not a sufficient number of officers at this post so that they could be used as drill instructors. Under the head of Officers on Duty at the School will be found a complete list of the officers serving here, this list including all officers who have served as drill instructors as well as instructors in other departments. Appendix I-1 includes a complete list of the instructors in the Military Subjects Department including drill instructors, with the exception of a few officers who were in the nature of administrative and disciplinary officers only.

c. Discipline. For the purposes of administration, drill and discipline, the cadets in the school were organized into a Junior Wing and a Senior Wing, the Junior Wing consisting of three squadrons and the Senior Wing of five squadrons. With the institution of the twelve weeks' course this organization into wings was abandoned, the sqadron then remaining the sole unit for the purposes of administration, drill and discipline. Squadron Commanders and Assistent Squadron Commanders were appointed by the head of the Drill and Discipline Department. They were responsible for their squadrons reporting to their various duties on time and properly equipped. Reports were made by the Sqadron Commanders to the head of the Drill and Discipline Department on any delinquencies of any men in their squadrons. Squadron Commanders also assisted in forming an estimate of the efficiency of the men in their sqadrons.

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Instruction - Drill and Discipline Department.

Numerous communications were received from the office of the Chief Signal Officer emphasizing the importance of discipline, and the Commandant of this school has always regarded this question as one of the most important in the conduct of the school. Several changes were made from time to time, with the idea of improving the discipline of the organization, among these changes being to require all squadrons to march to and from all classes, to form and march to all meals, the attendance of a commissioned officer at the meals, intensive instruction in drills, a commissioned officer detailed as OFFICER IN CHARGE who was required to sleep in the barracks, and the addition of as many formal ceremonies as could conveniently be held.

d. Drill and Ceremonies. Instruction in drill, as noted above, was carried out originally by civilian drill instructors, later by commissioned officers, members of the staff of the Drill and Discipline Department. The practical work covered in drill was always outlined in the curriculum of instruction which was followed closely at this school.

Formal inspection every Friday afternoon, followed by formal guard mount and the establishment of a night guard, was instituted in September, 1917. A drum and fife corps furnished the music during the early days when these ceremonies were being held.

In the early part of 1918, when the institution of a guard squadron was authorized, formal retreat followed by formal guard mount was held every afternoon except Saturday and Sunday, those days retreat and guard mount being informal. Formal squadron inspection was held by the Commandant on the field every Friday afternoon, following which the graduating squadron took position in the rear of the reviewing officer to witness the Friday afternoon review. The picture on page 257 shows one of the Friday afternoon inspections, the one on page 258 the graduating squadron review, and the one on page 259 is a picture of a formal guard mount.

In April, 1918, permission was secured to use the University band instruments, and the director of the University band was employed to develop a band among the cadets of the School of Military Aeronautics. This band proved very successful and was one of the important factors at all ceremonies conducted by the school, taking part in retreat, reviews, and formal guard mount. At times when the school was at its maximum size the band contained from forty to fifty pieces. A picture of the band is shown on page 260.

The formal ceremonies conducted by the School of Military Aeronautics gradually became a part of the University life at this institution and were greatly missed when it was finally necessary to abandon them. From one thousand to twenty-five hundred people were frequently present to watch the graduation review on Friday afternoons, and fairly large crowds were present to witness retreat and guard mount.

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Plate No. 44 - Friday Afternoon Inspection.

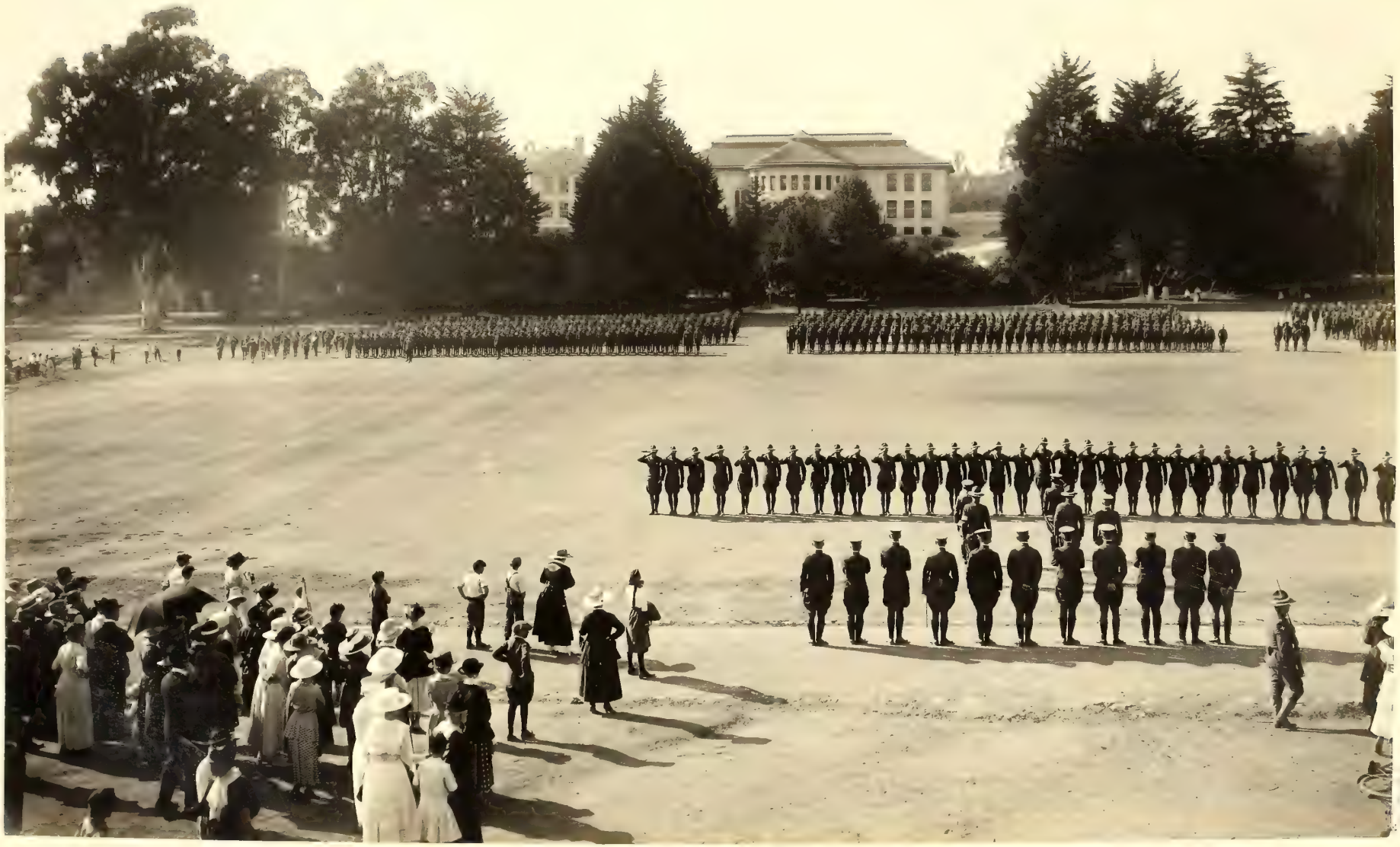

Plate No. 48 - Graduating Squadron Review

Plate No. 46 - Guard Mount.

Plate No. 47 - S. M. A. Cadet Band

Instruction - Drill and Discipline Department.

e. Guard. As noted under the head of Buildings for Instruction the question of protection of buildings was discussed. This has always been regarded as a serious problem at this institution, and the Commandant has always felt it essential that a proper guard be maintained. Before the institution of a cadet guard was authorized or was possible, civilian guards were maintained by the University.

Authority was obtained in January, 1918, to insert a guard squadron, this squadron to be used in maintaining a permanent day and night guard at the buildings in use by the school. This squadron was inserted as "CX" Squadron which came after the completion of theoretical instruction in Military Subjects. It is believed that the insertion of this guard squadron has proved very beneficial for the cadets in teaching them the proper method of mounting guard and the problems involved in properly guarding property.

With the inauguration of the twelve weeks' curriculum no provision was made for a guard squadron. Request to start this squadron again was at first disapproved, but when the conditions at this institution were properly understood by the authorities at Washington, permission was again granted to insert the guard squadron. It was inserted this time following "F" Squadron, and was known as "FX" Squadron. About June, 1918, in addition to the Officer in Charge of the Barracks, an Officer of the Day was appointed from among the officers of the post whose duty it was to inspect the guard each day according to the rules laid down in the Manual of Guard Duty. After the signing of the armistice and during the period of closing out of the school, the guard squadron was eliminated in order to decrease the length of the course as required by instructions from Washington.

f. Efficiency Marks. One of the duties of the Drill and Discipline Department was to submit a weekly report on efficiency of each cadet. The method and forms used for obtaining this record varied from time to time, but the following were some of the items used in compiling the weekly record of efficiency: neatness in barracks, personal neatness, promptness, Soldierly qualities and alertness. The Squadron Commanders, coming in close touch with the men in their squadron, were able to materially assist in preparing this record.

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Authority was obtained in January, 1918, to insert a guard squadron, this squadron to be used in maintaining a permanent day and night guard at the buildings in use by the school. This squadron was inserted as "GX" Squadron which came after the completion of theoretical instruction in Military Subjects. It is believed that the insertion of this guard squadron has proved very beneficial for the cadets in teaching them the proper method of mounting guard and the problems involved in properly guarding property.

With the inauguration of the twelve weeks' curriculum no provision was made for a guard squadron. Request to start this squadron again was at first disapproved, but when the conditions at this institution were properly understood by the authorities at Washington, permission was again granted to insert the guard squadron. It was inserted this time following "Y" Squadron, and was known as "YX" Squadron. About June, 1918, in addition to the Officer in Charge of the Barracks, an Officer of the Day was appointed from among the officers of the post whose duty it was to inspect the guard each day according to the rules laid down in the Manual of Guard Duty. After the signing of the armistice and during the period of closing out of the school, the guard squadron was eliminated in order to decrease the length of the course as required by instructions from Washington.

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15. INSTRUCTION - SPORTS.

a. General. The Department of Supervised Recreation and Organized Sports was first included in the curriculum of March 1, 1918, this curriculum calling for two hours daily devoted to,

1. Inter-squadron contests in foot ball, soccer, soft ball baseball, track athletics, or hockey, according to the season.

2. Informal sports, track athletics, tennis, fencing, wrestling boxing, gymnastics, rowing, swimming, etc., according to season and facilities.

3. Trap shooting or target practice with rifle or pistol.

The sports schedule was included for the definite purpose of making the cadets better and healthier officers. It was explained that the work was to be considered as a part of their course in the School, its purposes being, however, to provide recreation and maintain health, and was not to be taken so seriously as to divert the attention from their studies.

The curriculum of April 1, 1918 also included the subject of Supervised Recreation and Organized Sports, the same sports being included, but the time being reduced from two hours a day to five hours a week, and this is the time schedule that has been in effect in the sports program.

b. Staff. The instruction in this department has been carried out under the supervision of Professor F. L. Kleeberger, Head of the Department of Physical Education at the University of California, with the assistance of Earl H. Wight, and F. J. Cozens. From two to four additional assistants have been used from time to time, depending upon the size of the squadrons and the hour of the day in which the work had to be scheduled.

c. Equipment. The cost of instituting the sports program was rather heavy, and the maintenance cost has been fairly high, but it is believed the department has been of distinct advantage to the School and has been worth all that was spent on it. The work was divided primarily, between boxing, soft ball base ball, track and field work, including wall scaling. This necessitated expensive equipment, consisting of several hundred pairs of boxing gloves, hundreds of pairs of tennis shoes and gymnasium suits, and a large supply of balls, bats, etc. The initial expenditure for starting the program was as follows, based on a three months' schedule:

Shoes, $433.00 per month for three months or a total of	$1300.00
Equipment, boxing gloves, soccer balls, etc	850.00
Staff for three months at $500.00 per month	1500.00
Total initial expenditure approximately	$3650.00

initial expenditure for starting the program was as follows, based on a three months' schedule:

Shoes, $45.00 per month for three months or a total of	$135.00
Equipment, boxing gloves, soccer balls, etc	880.00
Staff for three months at $500.00 per month	1500.00
Total initial expenditure approximately	$2550.00

Instruction-Sports.

The space available for the instruction of sports, as well as the cost of equipment was the deciding factor in the choice of sports to be instituted. Sufficient grounds were not available for base ball and foot ball, at least so that all cadets could take part in the games. Boxing, soft ball base ball and track work are of a nature that all men could participate and the space required for these sports was not excessive.

d. Schedule of Hours. While the sports schedule has been of value, and was regarded as an important part of the instruction of this School, it was necessarily secondary to the technical instruction given in the other departments. For this reason the hours devoted to sports were based on the time available after the other departments had their schedules lined up. The hour, however, which was used for the greater part of the time and which proved most satisfactory was from 4:00 to 5:15 four days in the week. This allowed the men to get their exercise, take a bath and be on line in time for the afternoon Retreat and Guard Mount. At other times, however, it was necessary to schedule the sports program from 2:00 to 3:00 and also from 11:00 to 12:15 in the morning. The latter hour also proved very satisfactory.

e. Instruction. The following pages furnish an outline of the organization of the sports program. Briefly, this was as follows:

Squadrons A and B, boxing and wrestling
Squadrons C and D, grenade throwing, wall scaling, fence vaulting, etc.
Squadrons E and F, track and field work.
Squadrons G and H, soft ball base ball, relay races, etc.
Squadrons I, K, L, and M, trap shooting.

This schedule was revised from time to time, the squadrons being alternated in the different parts of the work, but the general outline has been very much the same throughout. Trap shooting, although included in this schedule as a part of the Organized Sports was always conducted by the Gunnery Department and has been discussed in detail in the report of that department.

f. Weekly Competitions. Weekly contests in boxing and in the other branches of sports were always held and a great deal of interest was taken in these competitions. Regular percentage tables showing the contests won and lost were prepared by this department in order to stimulate interest in the work, and a copy of the weekly report submitted by Professor Kleeberger in May, 1918 is included on the following pages. This report shows in detail the record kept of the sports schedule, the character of the contests held and the method of recording the winners.

The picture on pages 272 to 275 inclusive show squadrons taking part in soft ball baseball, boxing, track and field work, and vaulting and wall scaling.

Instruction - Sports.

The space available for the instruction of sports, as well as the cost of equipment was the deciding factor in the choice of sports to be instituted. Sufficient grounds were not available for base ball and foot ball, at least so that all cadets could take part in the games. Boxing, soft ball, base ball and track are of a nature that all men could participate and the space required for these sports was not excessive.

d. Schedule of Sports. While the sports schedule has been of value, and was regarded as an important part of the instruction of this school, it was necessarily secondary to the technical instruction given at the Ordnance School. For this reason the hours devoted to sports were based on the time available after the other departments had their schedules lined up. The hour, however, which was used for the greater part of the time and which proved most satisfactory was from 4:00 to 5:15 four days in the week. This allowed the men to get their exercise, take a bath and be on line in time for the afternoon Retreat and Guard Mount. At other times, however, it was necessary to schedule the sports program from 2:00 to 3:00 and also from 11:00 to 12:15 in the morning. The latter hour also proved very satisfactory.

e. Instruction. The following pages furnish an outline of the organization of the sports program. Briefly, this was as follows:

Squadrons A and B, boxing and wrestling
Squadrons C and D, gymnastic training, wall scaling, horse vaulting, etc.
Squadrons E and F, track and field work.
Squadrons G and H, soft ball base ball, relay races, etc.
Squadrons I, K, L, and M, trap shooting.

This schedule was revised from time to time, the squadrons being alternated in the different parts of the work, but the general outline has been very much the same throughout. [illegible] Organized Sports was always conducted by the Gunnery Department and has been discussed in detail in the report of that department.

f. Weekly Competitions. Weekly contests in boxing and in the various branches of sports were always held and a great deal of interest was taken in these competitions. Regular percentage tables showing the contests won and lost were prepared by this department in order to stimulate interest in the work, and a copy of the weekly report submitted by Professor Kleeberger in May, 1918 is included on the following pages. This report shows in detail the record kept of the sports schedule, the character of the contests held and the method of recording the winners.

The picture on page 17 of the Instructor shows a [illegible] wall scaling, horse vaulting, soft ball baseball, boxing, track and field work, and vaulting and wall scaling.

ORGANIZATION OF ATHLETICS FOR THE SCHOOL OF MILITARY AERONAUTICS

UNIVERSITY OF CALIFORNIA

SQUADRONS A-B
Mid field and Harmon Gymnasium for a period of two weeks.

3:10-3:25 Dressing.
3:25-4:00 Boxing and wrestling drills.
4:00-4:15 Individual competition, each squad leader forming his squad in a ring and pitting the men against one another in rotation, grading each man upon his individual efficiency.
Each squad through this process to determine the two boxers who are to represent it in inter-squad competition each day and the squadron in the weekly inter-squadron competition during the combat tournament to be held Friday afternoon.
4:15-4:30 Inter-squad competition.
F. L. Kleeberger and M. Freed in charge.
4:30-4:50 Time allowed for bathing and dressing.

SQUADRONS C-D
West Field.

3:10-3:25 Dressing.
Agility training through "war sports" such as grenade throwing, wal scaling, fency vaulting, etc.
Squad athletic leaders take charge of squads in personal competition looking forward to inter-squad and inter-squadron competition on the basis described above in a "war sports" Tournament. Competition to consist of five events; shelf scaling, rope climbing, twenty yard run carrying an injured or helpless person, hand wrestling, and tug-of-war. Efficiency of the individual to be graded by the squad leaders in consultation with the athletic instructors.
E. H. Wight and M. H. Triev in charge.
4:15-4:30 Inter-squad competition
4:30-4:50 Time allowed for bathing and dressing.

SQUADRONS E-F
Track

3:10-3:25 Dressing.
3:25-4:00 Track and field training. Groups to be kept in military units (squads, platoons, etc) during the practice of running, jumping, hurdling, etc.
4:00-4:15 Individual competition within each squad under the direction of the squad athletic leader to determine the representatives for inter-squadron Field and Track meet based upon five events; high jump, broad jump, hand vault, grenade throw and 100 yard dash. Efficiency grading of <u>each individual</u> by the squad leader in consultation with the athletic instructors.
Walter Christie and Mr._____ in charge.
4:15-4:30 Inter-squad competition.
4:30-4:50 Time allowed for bathing and dressing.

ORGANIZATION OF ATHLETICS FOR THE SCHOOL OF MILITARY AERONAUTICS

Department of Training.

3:10-3:25 Dressing.

3:25-4:00 Boxing and wrestling drills.

4:00-4:15 Individual competition, each squad leader forming his squad in a line and pitting the one opposite member in rotation, grading each man upon his individual efficiency.

Each man through this process is determine the two boxers who are to represent it in inter-squad competition each day and the squadron in the weekly inter-squadron competition during the social hour. Tournaments to be held Friday afternoon.

4:15-4:30 Inter-squad competition.

E. L. Kleeberger and M. Freed in charge.

4:30-4:50 Time allowed for bathing and dressing.

Wednesday 2-D
Inter-squad competition.

3:10-3:25 Dressing.

Agility training through "war sports" such as grenade throwing, wall scaling, honey vaulting, etc.

Squad athletic leaders take charge of squads in personal competition leading to inter-squad and inter-squadron competition on the basis described above in a "war sports" tournament. Competition to consist of five events; shell carrying, rope climbing, bayonet fencing for carrying an injured or helpless person, hand wrestling, and tug-of-war. Efficiency of the individual to be graded by the squad leaders in consultation with the athletic instructors.

E. H. Wight and M. H. Trivy in charge.

4:15-4:30 Inter-squad competition

4:30-4:50 Time allowed for bathing and dressing.

Friday 2-D
Track

3:10-3:25 Dressing.

3:25-4:00 Track and field training. Groups to be kept in military units (squads, platoons, etc) during the practice of running, jumping, vaulting, etc.

4:00-4:15 Individual competition within each squad under the direction of the squad athletic leader to determine the representatives for inter-squadron field and track meet based upon five events; high jump, broad jump, hand vault, pyramid throw and long run. Efficiency grading of each individual by the squad leader in consultation with the athletic instructors.

Walter Christie and M. _____ in charge.

4:15-4:30 Inter-squad competition.

4:30-4:50 Time allowed for bathing and dressing.

	3:10-3:25	Dressing.
	3:25-3:45	Squad leaders drill their men in "westmoreland" and advantage wrestling.
SQUADRONS G-H California Field	3:45-4:30	Competition between inter-squad and inter-squadron teams in multiple soccer, soft-ball baseball, group relay racing, obstacle racing, "over the top", pushball, "pivot the man", "pull away", "with the Kaiser", etc. F. W. Cozens in charge.
	4:30-4:50	Time allowed for bathing and dressing.
SQUADRONS I- K- L- M Traps or Rifle Range	3:00-4:30	Trap shooting and Rivle practice. Inter-squad and inter-squadron competition.

SERIES PERCENTAGE TABLE

School of Military Aeronautics May 30, 1918 University of California

Squadron		A	B	C	D	E	F	G	H
	Date	4/12/18	4/19/18	4/26/18	5/2/18	5/9/18		5/23/18	5/30/18
46	Won From		Draw with		C-47	Draw with			G-47
Lost	Lost to	B-45	A-47	D-45	B-48	F-45		H-45	
	Percentage	0.000	0.250	0.166	0.250	0.333		0.286	0.674
	Date	4/19/18		5/2/18	5/9/18	5/16/18	5/23/18	5/30/18	
47	Won From	Draw with			C-48		On		
	Lost to	B-46		B-48 D-46	B-49	D-48	Guard	H-46	
	Percentage	0.500		0.333	0.300	0.200		0.304	
	Date		5/2/18	5/9/18	5/16/18	5/23/18	5/30/18		
48	Won From		C-47 D-46		E-47	D-49 C-50			
	Lost To			D-47 B-49			D-50 E-49		
	Percentage		1.000	0.500	0.600	0.714	0.555		
	Date		5/9/18	5/16/18	5/23/18	5/30/18			
49	Won From		C-48 D-47	B-50	C-50	D-50 F-48			
	Lost To				E-48				
	Percentage		1.000	1.000	0.800	0.857			
	Date		5/6//18	5/23/18	5/30/18				
50	Won From				F-48				
	Lost To		C-49	D-49 E-48	E-49				
	Percentage		0.000	0.000	0.200				
	Date		5/23/18	5/30/18					
51	Won From		A-52	On					
	Lost to		[illegible]	Guard					
	Percentage		1.000						
	Date	5/23/18	5/30/18						
52	Won From								
	Lost To	B-51	A-53						
	Percentage	0.000	0.000						
	Date	5/30/18							
53	Won From	B-52							
	Lost To								
	Percentage	1.000							

SERIES PERCENTAGE TABLE

School of Military Aeronautics May 30, 1918 University of California

Location	A	B	C	D	E	F	G	H
Date	4/13/18	4/13/18	4/23/18	5/2/18	5/9/18		5/23/18	5/30/18
46 Won From		Draw with		G-47	Draw with			I-47
Lost to	E-44	A-47	C-45	F-45	F-45		H-46	
Percentage	0.000	0.000	0.000	0.000	0.000		0.286	0.571
Date	4/13/18		5/4/18	5/9/18	5/16/18	5/23/18	5/30/18	
47 Won From	Draw with			C-48		H		
Lost to	B-46	B-48 D-46		B-49	D-48	Guard	H-46	
Percentage	0.500		0.000	0.000	0.000			0.000
Date		5/5/18	5/7/18	5/15/18	5/22/18	5/30/18		
48 Won From		C-47 D-46		E-47	D-49 C-50			
Lost To			D-47 B-49			D-50 E-49		
Percentage		1.000	0.500	0.600	0.714	0.555		
Date		5/9/18	5/16/18	5/23/18	5/30/18			
49 Won From		C-48 D-47	B-50	C-50	D-50 E-48			
Lost To				B-48				
Percentage		1.000	1.000	0.800	0.667			
Date		5/12/18	5/22/18	5/30/18				
50 Won From				E-48				
Lost To		C-49	D-49 E-48	E-49				
Percentage		0.000	0.000	0.000				
Date		5/23/18	5/30/18					
51 Won From		E-50	Gu					
Lost To			Guard					
Percentage		1.000						
Date	5/24/18	5/30/18						
52 Won From								
Lost To	B-51	A-53						
Percentage	0.000							
Date	5/30/18							
53 Won From								
Lost To								
Percentage	1.000							

ORGANIZED SPORTS

Squadron 46

School of Military Aeronautics, May 30, 1918, University of California.

Name	No.	Grade	Name	No.	Grade
Anderson, C. H.	834	2	*Hammond, E. J.	845	
Barnes, P. S.	878	2	Henderson, H. J.	774	1
***Barr, J.	865		Honeywell, C. F.	890	1
**Bottenfield, W. B.	835		Hostetler, I. P.	776	2
Burbeck, W. D.	879	2	Jones, S. S.	850	2
*Carmichael, G. A.	825		Martin, C. O.	892	1
Chenoweth, C. G.	880	2	Merritt, W. C.	792	1
Chochrane, J. R.	815	3	Morley, B. C.	895	2
Copeland, Wm. H.	881	2	Mylar, F. J.	896	2
Coyle, B.	895	2	Parkhill, H. L.	829	2
Dibble, L. C.	910	2	Reed, E. M.	899	2
English, N. A.	883	1	Ruick, M. H.	900	1
Fennell, J. E.	884	3	Sheperd, H. W.	902	1
Fleming, J. G.	885	3	Smith, E. E.	905	2
*Galeoto, J. C.	843		Stephenson, N. M.	737	2
Gates, M. W.	886	2	Storrie, W.	916	3
Garrett, C. W.	872	3	Walker, E. S.	907	3
Gooding, C. C.	887	2	Weede, R. O.	908	2
Graham, G.	706	1	Williams, Wm. G.	914	3
Griffith, C. W.	761	2	Young, J. H.	909	3
Harriman, F. A.	888	1			

* Grade given in Squadron 45 (see report of May 23, 1918.)
** Band.
*** Physical injury.

(Signed) Charles F. Honeywell.

Squadron Commander.

HOLDING GROUNDS

[illegible] aeronautics, May 20, 1918, University of Cali[illegible].

Name	No.	Grade	Name	No.	Grade
Anderson, O. H.	884	2	[illegible], [illegible]	[illegible]	
Barnes, P. S.	878	2	Henderson, H. J.	774	1
***Barr, J.	885		Honeywell, C. F.	890	1
**Bottenfield, W. B.	885		Hostetler, I. F.	776	2
Burbeck, W. D.	879	2	Jones, D. S.	880	2
*Carmichael, C. A.	885		Martin, C. C.	892	1
Chenoweth, C. G.	880	2	Merritt, W. C.	792	1
Choquette, J. R.	815	2	Morley, B. C.	895	2
Copeland, Wm. H.	881	2	Myler, F. J.	896	2
Coyle, B.	[illegible]	2	[illegible], [illegible]	[illegible]	2
Dibble, E. C.	910	2	Reed, E. M.	899	2
English, M. A.	883	1	Rulok, M. H.	900	1
Fennell, J. A.	884	2	Shepard, H. W.	902	1
Fleming, J. C.	885	2	Smith, A. A.	903	2
*Galeoto, J. C.	843		Stephenson, M. M.	797	2
Gates, M. W.	886	2	Storrie, W.	916	2
Garrett, C. W.	872	2	Walker, A. S.	907	2
Gooding, C. C.	887	2	Weede, R. O.	908	2
Graham, G.	706	1	Williams, Wm. G.	914	2
Griffith, C. W.	761	2	Young, J. H.	909	2
Harriman, F. A.	888	1			

* Grade given in Squadron 45 (see report of May 23, 1918.)
** Band.
*** [illegible].

(Signed) Charles F. Honeywell.

[illegible] Commander.

SERIES PERCENTAGE TABLE NO. 2

May 30, 1918.

Statement of relative percentages of the squadrons graduated from Organized Sports.

Squadron	Tournaments			Final Percentage
	Won	Lost	Draw	
42	4	0	0	1.000
43	1	5	0	0.166
44	4	1	0	0.800
45	3	4	0	0.428
46	2	4	2	0.375

[illegible]

[illegible]

Distribution of [illegible] ages of the squadrons graduated from Organized Sports.

[illegible]	Tournaments		Final Percentage
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	[illegible]	1.000
[illegible]	1	0	0.[illegible]
[illegible]	1	0	0.800
[illegible]	[illegible]	0	0.429
[illegible]	[illegible]	[illegible]	0.375

BOXING COMPETITION
May 30, 1918.

SQUAD	SQUADRON	NAME	NUMBER	RESULTS
	E-48-1	Vorachek, F. L.	954	Draw
	E-49-1	Wilkinson, G. B.	957	
Squad 1	D-50-1	Kelly, J. A.	1020	Won
	F-48-2	Raithel, A. G.	946	
	D-50-2	Boyle, D. M.	1073	Won
		Voigt, L. E.	1035	
	F-48-1	Palmer C. A.	982	
	E-49-2	Young, T. A.	1036	Won
Squad 2	D-50-1	Simpson, E.	1031	Won
	F-48-2	Regan, P. T.	984	
	D-50-2	Hood, W. J.	1016	
		Wilkinson, G. S.	957	Won
	F-48-1	Strong, F. A.	991	
	E-49-1	McKim, F. L.	1024	Won
	D-50-1	Wheeler, M. S.	1074	
Squad 3	F-48-2	Lambern, B. L.	998	Won
	D-50-2	Kennedy, J. R. P.	1056	
	E-49-2	Southwick	1034	Won
	F-48-1	Eaton, C. S.	963	Won
	E-49-1	Murphy, S. S.	1025	
	D-50-1	Wright, A. W.	1075	Won
Squad 4	F-48-2	Rich, J. L.	948	
	D-50-2	Almstead, Ph.	1060	
	E-49-2	Baird, R. W.	1037	Won

Squadron Percentage -- D-50 0.474
Squadron Percentage -- F-48 0.439
Squadron Percentage -- E-49 0.722

Series Percentage----- F-48 0.555
Series Percentage----- E-49 0.857
Series Percentage----- D-50 0.200

[illegible]

TRACK COMPETITION

May 30, 1918.

Inter-Squadron — Squadrons G-47 H-46

100 Yard Dash — Time 11:1 sec.
Won by Harriman 888 (46); 2nd English 883 (46) ; 3rd Ruick 900 (46).

120 Yard Hurdles — Time 14:3 sec.
Won by Henderson 774 (46); 2nd Manildi 942 (47); 3rd Barnes 878 (46

Broad Jump — Distance 20'1"
Won by Jump 937 (47); 2nd Honeywell 890 (46) 3rd Carmichael 825 (46).

High Jump — Height 5'1"
Won by Burkholder 921 (47); 2nd Graham 706 (46); 3rd Parkhill 829 (46).

Grenade Throw
Won by Reed 899 (46): Moreley 895 (46), Cockran 915 (46), Fennell 884 (46), Burbeck 879 (46), Sheperd 902 (46), Graham 912 (47), McAnear 944 (47) tied for second.

Hand Vault
Won by Hammond 845 (46); 2nd Chenoweth 880 (46); 3rd Mylar 896 (46).

Shelf Scaling — Time 4:2/5 sec.
Won by Week 908 (46); 2nd Clarkson 923 (47); 3rd Camper 922 (47) & Davis 926 (47)

Wall Scaling — Time 58:0 sec.
Won by Squadron 46 (8 man team).

Relay Race — Time 1:04:1
Won by Squad 2 (46); 2nd Squad 2 (47) 3rd Squad 1 (46).

Total Score of the Meet.

Points	Squadron 46	Squadron 47
100 Yard Dash	9	0
120 Yard Hurdles	6	3
Broad Jump	4	5
High Jump	4	5
Grenade Throw	7 6/7	1 1/7
Hand Vault	9	0
Shelf Scaling	5	4
Wall Scaling	5	4
Relay Race	6	3
Total Points	55 6/7	21 1/7

Squadron Percentage--H-46	0.674
Squadron Percentage--G-47	0.304
Series Percentage----H-46	0.375
Series Percentage----G-47	0.166

Track Competition
by C. Ish.

Fifth-Squadron — Squadron 46 [illegible]

---

100 Yard Dash — Time 11:1 sec.
Won by Burtham 380 (46); 2nd [illegible] 664 (46); 3rd [illegible] 802 (46).

---

120 Yard Hurdles — Time 14:3 sec.
Won by Henderson 774 (46); 2nd Manildi 942 (47); 3rd Barnes 878 (46

Broad Jump — Distance 20'1"
Won by Jump 927 (47); 2nd Honeywell 890 (46) 3rd Carmichael 825 (46).

High Jump — Height 5'1"
Won by [illegible] 447 (47); 2nd [illegible] 705 (46); 3rd [illegible] 5[illegible] (46).

Grenade Throw
Won by Reed 899 (46); Morely 895 (46), Cookman 915 (46), Pennell 884 (46),
Burbock 879 (46), Sheperd 902 (46), Graham 912 (47), Meaneer 944 (47)
tied for second.

Hand Vault
Won by Hammond 845 (46); 2nd Chenoweth 880 (46); 3rd Mylar 896 (46).

Shelf Vaulting — Time 4:[illegible] sec.
Won by [illegible] 905 (46); 2nd [illegible] 723 (47); 3rd [illegible] 362 (47) [illegible] 325 (47)

Wall Vaulting — Time 58:0 sec.
Won by Squadron 46 (8 man team).

Relay Race — Time 1:04:1
Won by Squad 2 (46); 2nd Squad 2 (47) 3rd Squad 1 (46).

Total Score of the Meet.

Events	Squadron 46	Squadron 47
100 Yard Dash	9	0
120 Yard Hurdles	6	3
Broad Jump	4	5
High Jump	4	5
Grenade Throw	7 6/7	1 1/7
Hand Vault	9	0
Shelf Vaulting	5	4
Wall Vaulting	5	4
[illegible]	6	3
Total Points	55 6/7	21 1/7

[illegible] Percentage——[illegible] 0.67[illegible]
[illegible] Percentage——[illegible] 0.30[illegible]

[illegible] Percentage——Total 0.67[illegible]
[illegible] Percentage——[illegible] 0.1[illegible]

BASEBALL COMPETITION

Inter-Squadron

Squadrons B 52 A 53

Squad		Squadron	Innings	Score	Results
Squad 1		B-52	8	14	Winner
	vs				
Squad 1		A-53	8	7	
Squad 2		B-52	8	1	
	vs				
Squad 2		A-53	8	4	Winner
Squad 3		B-52	8	17	Winner
	vs				
Squad 3		A-53	8	2	
Squad 4		B-52	8	10	
	vs				
Squad 4		A-53	8	12	Winner
Squad 5		B-52	8	7	
	vs				
Squad 5		A-53	8	9	Winner
Squad 6		B-52	8	8	
	vs				Draw
Squad 6		A-53	8	8	
Squad 7		B-52	8	2	
	vs				
Squad 7		A-53	8	7	Winner

Squadron Percentage--B-52 0.366
Squadron Percentage--A-53 0.643

Series Percentage----B-52 0.000
Series Percentage----A-53 1.000

Legend		Accession	Identity	Score	Results
Legend 1	vs	B-52	3	1	Minor
Legend 2		A-53	3	7	
Legend 3	vs	B-[illegible]	3	1	
Legend 3		A-[illegible]	3	1	Minor
Legend 2	vs	B-[illegible]	3	17	Minor
Legend 4		A-[illegible]	3	2	
Legend 4	vs	B-[illegible]	3	12	
Legend 4		A-[illegible]	3	12	Minor
Legend 5	vs	B-[illegible]	3	7	
Legend 5		A-[illegible]	3	3	Minor
Legend 6	vs	B-52	3	6	Minor
Legend 6		A-[illegible]	3	3	
Legend 7	vs	B-[illegible]	3	[illegible]	
Legend 7		A-52	3	1	Minor

Plate No. 48 - Sports - Soft Ball Baseball

Plate No. 49 - Sports - Boxing

Plate No. 50 - Sports - Track and Field Work.

Plate No. 51 - Sports - Vaulting and Wall Scaling

L. CADET CORPS

1. STATUS:

The cadets in the School of Military Aeronautics, from the beginning of the school in May 1917 until September 1, 1917, were privates, first class, in the Signal Corps, being paid at the rate of $33.00 per month and 75¢ per day commutation for rations. On September 1, 1917 the Schools of Military Aeronautics were classed as Reserve Officers Training Camps and the pay was increased to $100.00 per month with 60¢ per day allowance for rations. This arrangement held until April, 1918, when the status of the cadets reverted to that of privates, first class, with pay at $33.00 per month and $1.00 per day allowance for rations.

The early privates of the school were informed that when they successfully completed their flying instruction they would be commissioned First Lieutenants. In October, 1917, however, a change in this ruling was made to the effect that upon completion of the R.M.A. tests they would be commissioned as Second Lieutenants, then advanced in rank upon completion of the J.M.A. tests.

2. GENERAL:

The cadets in this School of Military Aeronautics have been quartered in barracks provided by the University with the exception of the earlier months of operation. For a few weeks after the opening of the school they lived in boarding houses and fraternity houses near the campus, later moving into a brick building rented by the Government for barracks purposes. The University has also conducted the mess since December 1, 1917, prior to that time the mess being controlled by private parties.

While in the school, for the purpose of identification and easy reference, cadets have worn a button bearing a personal number assigned to each man when he entered "A" squadron. It was required that these buttons be worn at all times and, in fact, they served as passes to the Aeronautics building and to the mess.

All literature, books, syllabi, etc. used by the cadets were obtained by them from the Tool Room by means of tool checks, each cadet upon entering being given six small brass tool checks with a number agreeing with his personal number. When any article was desired from the Tool Room, a tool check was deposited with the Tool Room Keeper and held by him until the article was returned by the cadet. A clearance receipt from the Tool Room Keeper was necessary before final clearance from the school could be obtained. In addition to the literature in the Tool Room, the University Library was open to all cadets of the School of Military Aeronautics who cared to, or had time, to make use of it. A large number of books and periodicals bearing on aeronautics were placed on certain shelves in the library and were made easily accessible for anyone wishing to refer to them.

A. [illegible]

1. [illegible]

The cadets in the School of Military Aeronautics, from the beginning of the school in May 1917 until September 1, 1917, were private, first class, in the Signal Corps, being paid at the rate of $24.00 per month and $1 per day commutation for rations. On September 1, 1917 the cadets at military aeronautics were placed on reserve officers training duty and the pay was increased to $100.00 per month with $1 per day allowance for rations. This arrangement held until April, 1918, when the status of the cadets reverted to that of privates, first class, with pay at $24.00 per month and $1.00 per day allowance for rations.

The early privates of the school were informed that when they successfully completed their flying instruction they would be commissioned Air[illegible] Lieutenants. In October, 1917, however, a change in this ruling was made to the effect that upon completion of the G.A.A. tests they would be commissioned as second lieutenants, then advanced in rank upon completion of the L.M.A. tests.

2. [illegible]

The cadets in this school of military aeronautics were housed in barracks provided by the University with the exception of the earlier months of operation. For a few weeks after the opening of the school they lived in boarding houses and fraternity houses near the campus, later moving into a brick building rented by the Government for barracks purposes. The University has also conducted the mess since November 1, 1917, prior to that time the mess being conducted by private parties.

While in the school, for the purpose of identification and easy reference, cadets bore with a button bearing a personal number assigned to each one, also a private "C" number. It was required that these buttons be worn at all times and, in fact, they served as passes to the aeronautics building and to the mess.

All literature, books, syllabi, etc. used by the cadets were obtained by them from the Unit Book by means of book checks, each cadet upon arriving being given six small green book checks with a number appearing with his personal number. Then any article was desired from the Unit Book, a book check was exchanged with the Unit Book Keeper and held by him until the article was returned by the cadet. A clearance receipt from the Unit Book Keeper was necessary before final clearance from the school could be obtained. In addition to the literature in the Unit Book, the University library was open to all cadets of the School of Military Aeronautics who cared to, at any time, to make use of it. A large number of books and periodicals bearing on aeronautics were placed on certain shelves in the library and were made easily accessible for anyone wishing to refer to them.

Cadet Corps.

Special instructions to the cadets were issued, with the consent of the Commandant, through the Military Subjects Department, this being done at the opening lecture of the Military Subjects Department in "A" squadron. A copy of these special instructions is included with the syllabi of the Military Subjects Department attached as an appendix to this report. Cadets were required to salute civilian instructors in the class room, when addressing them outside or when being addressed by an instructor. On other occasions the salute was not required.

3. INTERIOR ORGANIZATION:

During the early months of operation the cadet corps was organized into a Junior Wing of three squadrons and a Senior Wing of five squadrons, as outlined in the chart of organization furnished by Washington. The real operating and administrative unit has been the squadron with less emphasis upon the two wing formations. When the length of the course was increased to twelve weeks the Junior and Senior Wings were abandoned and the squadron became the real unit of organization. Squadron Commanders were appointed by the officers in charge of the barracks or the head of the Drill and Discipline Department. The Squadron Commanders made the customary reports on their squadrons regarding any delinquencies or minor questions of discipline. As the size of the squadrons increased an assistant squadron commander was appointed for each squadron to help out with the paper work required. The question of interior organization for proper instruction in drill and discipline is discussed further under the head of the Drill and Discipline Department.

4. PERSONNEL:

The type of men sent to the school from time to time has been the subject of some discussion and information was requested in June, 1918, by the War Department for a comparison of the personnel of the cadets then being sent with the personnel of the men formerly received by the school in 1917. This request was referred to Heads of Departments and the members of the staff of instructors as they were closest in touch with the cadets. The consensus of opinion at that time was that the men being received during 1918 were not of as high caliber as the men received in the months of 1917, the opinion being that the educational qualifications were not as high and the men not capable of absorbing as quickly and as thoroughly the material furnished them as the earlier cadets had been. There were, of course, exceptions to this general statement and a report of this sort was necessarily an expression of opinion but the opinion was practically unanimous only one Head of Department making the statement that the personnel of the cadets of 1918 compared favorably with those of 1917.

5. SCHEDULE OF CALLS:

Copies of "Schedule of Calls" are furnished on the following pages showing the general routine of work as followed by the cadets in the School of Military Aeronautics. The Schedule of Calls was changed from time to time on account of the seasons of the year and also to include new features of the work such as formal guard mount, formal retreat, etc.

Cadet Corps.

Special instructions to the cadets were issued, with the consent of the commandant, through the Military Subjects Department, this being done at the opening lectures of the Military Subjects Department in "A" squadron. A copy of these special instructions is included with the original of the military drills report-- which attached as an appendix to this report. Cadets were required to salute civilian instructors in the class room, when addressing them outside of such being addressed by an instructor. On other occasions the salute was not required.

3. Instructor [illegible]

During the early months of operation the cadet corps was organized into a regular Wing of three squadrons and a junior Wing of five squadrons, as outlined in the above organization [illegible] of training. The real operation and administrative unit has been the squadron with less regards upon the run drill formations. Upon the length of the course was increased to twelve weeks the junior and senior wings were combined and the squadron became the real unit of organization. Squadron Commanders were appointed by the officers in charge of the training on the basis of the drill and physical training department. The squadron commanders made the monthly reports on their squadrons regarding any deficiencies or minor qualities of cadetship. As the size of the squadrons increased an assistant squadron commander was appointed for each squadron to help out with the paper work required. The organization of transport organizations for proper instruction in drill and discipline is discussed further under the head of the drill and physical department.

4. [illegible]

The type of men sent to the school from time to time has been the subject of some discussion and interpretation was reported in June, 1918, by the [illegible] for a comparison of the personnel of the cadets then being left with the personnel of the men formerly received in the school in 1917. This report was referred to Heads of Departments and the members of the staff of instructors as they were closer in touch with the cadets. The consensus of opinion at that time was that the men being received during 1918 were not of as high quality as the men received in the months of 1917, the opinion being that the educational qualifications were not as high and the men not capable of according as quickly and as thoroughly the required training than as the earlier cadets had been. There were, of course, exceptions to this general statement and a report of this sort was necessarily an expression of opinion but the opinion was practically unanimous only one head of department holding the statement that the personnel of the cadets of 1918 compared favorably with those of 1917.

5. [illegible] of [illegible]

Copies of "Weekly Bulletins" are included in the following pages showing the general routine of work as followed by the cadets in the School of Military Instruction. The numbers of cadets was changed from time to time in accordance of the need and also to indicate the features of the work such as formal field mount, formal review, etc.

Cadet Corps

HEADQUARTERS
SCHOOL OF MILITARY AERONAUTICS
University of California,
Berkeley.

July 27, 1917.

Special Orders,)
No. 11.)

2. Schedule of calls to go into effect Monday, July 30, 1917.

JUNIOR WING:

	DAILY	SATURDAYS	SUNDAYS
REVEILLE first call	5:30 a.m.	5:30 a.m.	7:30 a.m.
" " assembly	5:40 a.m.	5:40 a.m.	7:40 a.m.
Calisthenics immediately after Reveille.			
MESS	6:10 a.m.	6:10 a.m.	8:00 a.m.
INSPECTION	- - - - -	7:45 a.m.	- - - - -
DRILL	7:35 - 9:00 a.m.	7:35 -9:00 a.m.	- - - - -
SCHOOL	9:10 -10:00 a.m.	9:10-10:00 a.m.	- - - - -
"	10:10 -11:00 a.m.	10:10-11:00 a.m.	- - - - -
DRILL	11:10 -12:00 m.	11:10-12:00 m.	- - - - -
MESS	12:00 Noon	12:00 Noon	12:30 p.m.
SCHOOL	2:10 - 3:00 p.m.	- - - - -	- - - - -
INFANTRY DRILL	3:10 - 5:00 p.m.	- - - - -	- - - - -
RETREAT - first call	5:55 p.m.	5:55 p.m.	5:55 p.m.
assembly	6:00 p.m.	6:00 p.m.	6:00 p.m.
MESS immediately after Retreat.			
BUZZER PRACTICE	7:55 - 8:55 p.m.	- - - - -	7:55 -8:55 p.m.
TATTOO	9:10 p.m.	10:00 p.m.	9:10 p.m.
TAPS	9:30 p.m.	11:00 p.m.	9:30 p.m.

Arnold N. Krogstad.
Captain, J. M. A., Signal Corps,
Commandant.

Arnold N. Krogstad.
Commandant.

Cadet Corps

HEADQUARTERS
SCHOOL OF MILITARY AERONAUTICS,
University of California,
Berkeley.

July 27, 1917.

Special Orders,)
)
No. 11.)

1. Schedule of calls to go into effect Monday, July 30, 1917:

SENIOR WING.

	DAILY	SATURDAYS	SUNDAYS
REVEILLE first call	6:30 a. m.	6:30 a.m.	7:30 a.m.
assembly	6:40 a. m.	6:40 a.m.	7:40 a.m.
Calistenics immediately after reveille.			
MESS	7:10 a.m.	7:10 a.m.	7:30 a.m.
INSPECTION		7:45 a.m.	- - - - -
SCHOOL	8:10 - 9:00	8:10- 9:00	- - - - -
"	9:10 -10:00	9:10-10:00	- - - - -
"	10:10 -11:00	10:10-11:00	- - - - -
"	11:10 -12:00	11:10-12:00	- - - - -
MESS	12:00 Noon	12:00 Noon	12:30 p.m.
SCHOOL	2:10 - 3:00	- - - - - -	- - - - - -
"	3:10 - 4:00	- - - - - -	- - - - - -
DRILL	4:10 - 5:00	- - - - - -	- - - - - -
RETREAT first call	5:55 p.m.	5:55 p.m.	5:55 p.m.
assemble	6:00 p.m.	6:00 p.m.	6:00 p.m.
MESS	Immediately after retreat.		
STUDY	7:55 - 9:55 p.m.	- - - - - -	7:55-9:55 p.m.
TATTOO	10:10	10:10	10:10
TAPS	10:30	11:00	10:30

Arnold N. Krogstad.
Captain, J. M. A., Signal Corps,
Commandant.

Signal Corps.

TRANSMITTING
SCHOOL OF MILITARY AERONAUTICS,
University of California,
Berkeley.

Special Orders,
No. 14.

Berkeley, July 17, 1917.

1. Schedule of calls to go into effect Monday, July 30, 1917:

BELOW TIER.

	Call 1	Call 2	Call 3
REVEILLE first call	6:30 a. m.	6:30 a.m.	7:00 a.m.
reserve	6:40 a. m.	6:40 a.m.	7:10 a.m.
Officers immediately after reveille.			
MESS	7:10 a.m.	7:10 a.m.	7:40 a.m.
"SICK CALL"		7:45 a.m.	- - - - - -
ROUNDS	8:10 - 9:00	8:10- 9:00	- - - - - -
"	9:10 -10:00	9:10-10:00	- - - - - -
"	10:10 -11:00	10:10-11:00	- - - - - -
"	11:10 -12:00	11:10-12:00	- - - - - -
MESS	12:00 noon	12:00 noon	12:30 p.m.
RECESS	2:10 - 3:00	- - - - - - -	- - - - - - -
"	3:10 - 4:00	- - - - - - -	- - - - - - -
DRILL	4:10 - 5:00	- - - - - - -	- - - - - - -
RETREAT first call	6:50 p.m.	6:50 p.m.	7:20 p.m.
assembly	6:55 p.m.	6:55 p.m.	7:25 p.m.
TAPS	Immediately after retreat.		
SOUP	7:55 - 9:55 p.m.	- - - - - -	7:55-9:55 p.m.
"TATTOO"	10:00	10:00	10:00
TAPS	10:30	10:30	10:30

Arnold N. Krogstad,
Capt., U. S. A., Signal Corps,
Commandant.

Headquarters
UNITED STATES SCHOOL MILITARY AERONAUTICS
Berkeley, Cal.

SCHEDULE OF CALLS.

April 3rd, 1918.

CALLS	DAILY	SATURDAY	SUNDAY
FIRST CALL	6:00	6:00	8:00
MARCH	6:05	6:05	8:05
REVEILLE	6:15	6:15	8:15
ASSEMBLY (For Reveille and Mess)	6:20	6:20	8:20
DRILL CALL (For Calistenics)	7:15	7:15	
ASSEMBLY (For Calistenics)	7:20	7:20	
RECALL	7:50	7:50	
DRILL CALL	7:55		
SCHOOL CALL	7:55	7:55	
ASSEMBLY (For School and Drill)	8:00	8:00	
GUARD MOUNT			10:00
ASSEMBLY			10:10
ADJUTANT'S CALL			10:12
MESS CALL	12:10	12:10	12:25
ASSEMBLY FOR MESS	12:15	12:10	12:30
SICK CALL	12:50	12:50	
SCHOOL CALL	1:55		
ASSEMBLY (For School)	2:00		
DRILL CALL	4:07		
ASSEMBLY (For Drill)	4:12		
GUARD MOUNT	4:10	1:00	
ASSEMBLY	4:20	1:10	
ADJUTANT'S CALL	4:22	1:12	
ADJUTANT'S CALL (For Retreat)	5:10		
MESS CALL - 2 minutes after Parade		5:25	4:55
ASSEMBLY (For Mess)		5:30	5:00
CALL TO QUARTERS	7:30		9:30
TATTOO	9:30	10:45	9:45
TAPS	10:00	11:00	10:00

BY ORDER LT. COLONEL HUNTER:

Captain, Sig. R. C. A. S.
Adjutant.

HEADQUARTERS
CADET CORPS - SCHOOL MILITARY ACADEMY/TCE
Toronto, Ont.

SCHEDULE OF CALLS.

Sunday, June, 1974.

DATE	DATE	CADETS	ADMIN
FIRST CALL.....	6:00	6:00	8:00
MAGGIE.....	6:05	6:05	8:05
REVEILLE.....	6:15	6:15	8:15
BREAKFAST (For Officials and Cadets).....	6:30	6:30	8:30
INITIAL CALL (For Cadetsonly).....	7:15	7:15	
ASSEMBLY (For Cadetsonly).....	7:20	7:20	
ASPHALT.....	7:25	7:25	
DRILL CALL.....	7:30		
SUNDAY CALL.....	7:50	7:50	
ASSEMBLY (For School and Drill).....	8:00	8:00	
GUARD MOUNT.....			10:00
ASSEMBLY.....			10:20
ALTERNATE'S CALL.....			10:25
MESS CALL.....	11:00	11:00	12:05
ASSEMBLY FOR MESS.....	12:15	12:10	12:30
FIRST CALL.....	12:50	12:50	
SECOND CALL.....			
ASSEMBLY (For Parade).....	2:00		
FIRST CALL.....	4:07		
ASSEMBLY (For Drill).....	4:15		
FINAL POINT.....	4:10	4:00	
ASSEMBLY.....	4:20	4:20	
ADJUTANT'S CALL.....	4:22	4:22	
ADJUTANT'S CALL (For retreat).....	5:10		
MESS CALL - 2 minutes after Parade....		5:20	4:25
ASSEMBLY (For Mess).....		5:30	5:00
CALL TO QUARTERS.....	7:30		9:30
CADETS.....	9:30	10:45	9:45
LIGHTS.....	10:00	11:00	10:00

BY ORDER LT. COLONEL HUNTER:

Captain, Sig. R. C. A. S.
ADJUTANT.

Headquarters
UNITED STATES SCHOOL MILITARY AERONAUTICS
Berkeley, Cal.

SCHEDULE OF CALLS.

November 30th, 1918.

CALLS	Mondays, Wednesday and Fridays	Tuesdays & Thursdays	Saturdays	Sundays
FIRST CALL	6:00	6:00	6:00	8:00
MARCH	6:05	6:05	6:05	8:05
REVEILLE	6:10	6:10	6:10	8:15
ASSEMBLY - For Reveille and Mess	6:15	6:15	6:15	
DRILL CALL For Calistenics	7:25	7:25	7:25	
RECALL " From Calistenics	7:50	7:50	7:50	
DRILL CALL	7:55	7:55		
SCHOOL CALL	7:55	7:55	7:55	
ASSEMBLY FOR SCHOOL and DRILL	8:00	8:00	8:00	
MESS CALL	12:15	12:15	12:15	12:25
SICK CALL	12:25	12:25	12:25	
SCHOOL CALL	1:55	1:55		
ASSEMBLY FOR SCHOOL	2:00	2:00		
FIRST CALL - For Guard Mount	4:15	5:10	4:15	4:15
ASSEMBLY For Guard Mount	4:19	5:14	4:19	4:19
ADJUTANT'S CALL For Guard Mount	4:20	5:15	4:20	4:20
ADJUTANT'S CALL For Retreat	4:30	5:16		
MESS CALL	6:10	6:10	6:10	4:55
ASSEMBLY For Mess	6:15	6:15	6:15	5:00
CALL TO QUARTERS	7:30	7:30		9:30
TATTOO	9:30	9:30	10:45	9:45
TAPS	10:00	10:00	11:00	10:00

BY ORDER OF MAJOR CRANE:

Guy W. Rogers
2nd Lt., Aviation Section, Sc.,
Adjutant.

Headquarters
Corps Flying School Detachment
Mineola, Cal.

Schedule of Flying.

November 20th, 1918.

CALLS	Monday, Wednesday and Friday	Tuesday, Thursday	Saturdays
	8:00	8:00	8:00
	8:05	8:05	8:05
	8:10	8:10	8:10
	8:15	8:15	8:15
	8:20	8:20	8:20
	8:25	8:25	8:25
	8:30	8:30	8:30
	8:35	8:35	8:35
	8:40	8:40	8:40
	8:45	8:45	8:45
	8:50	8:50	8:50
	8:55	8:55	8:55
	9:00	9:00	9:00
	9:05	9:05	9:05
	9:10	9:10	9:10
	9:15	9:15	9:15
	9:20	9:20	9:20
	9:25	9:25	9:25
	9:30	9:30	9:30
	9:35	9:35	9:35
	9:40	9:40	9:40
	9:45	9:45	9:45
	9:50	9:50	9:50
	9:55	9:55	9:55
	10:00	10:00	10:00
	10:05	10:05	10:05
	10:10	10:10	10:10
	10:15	10:15	10:15
	10:20	10:20	10:20
	10:25	10:25	10:25
	10:30	10:30	10:30
	10:35	10:35	10:35
	10:40	10:40	10:40
	10:45	10:45	10:45
	10:50	10:50	10:50
	10:55	10:55	10:55
	11:00	11:00	11:00
	11:05	11:05	11:05
	11:10	11:10	11:10
	11:15	11:15	11:15
	11:20	11:20	11:20
	11:25	11:25	11:25
	11:30	11:30	11:30
	11:35	11:35	11:35
	11:40	11:40	11:40
	11:45	11:45	11:45
	11:50	11:50	11:50
	11:55	11:55	11:55
	12:00	12:00	12:00
	12:05	12:05	12:05
	12:10	12:10	12:10
	12:15	12:15	12:15
	12:20	12:20	12:20
	12:25	12:25	12:25
	12:30	12:30	12:30
	12:35	12:35	12:35
	12:40	12:40	12:40
	12:45	12:45	12:45
	12:50	12:50	12:50
	12:55	12:55	12:55
	1:00	1:00	1:00
	1:05	1:05	1:05
	1:10	1:10	1:10
	1:15	1:15	1:15
	1:20	1:20	1:20
	1:25	1:25	1:25
	1:30	1:30	1:30
	1:35	1:35	1:35
	1:40	1:40	1:40
	1:45	1:45	1:45
	1:50	1:50	1:50
	1:55	1:55	1:55
	2:00	2:00	2:00
	2:05	2:05	2:05
	2:10	2:10	2:10
	2:15	2:15	2:15
	2:20	2:20	2:20
	2:25	2:25	2:25
	2:30	2:30	2:30
	2:35	2:35	2:35
	2:40	2:40	2:40
	2:45	2:45	2:45
	2:50	2:50	2:50
	2:55	2:55	2:55
	3:00	3:00	3:00
	3:05	3:05	3:05
	3:10	3:10	3:10
	3:15	3:15	3:15
	3:20	3:20	3:20
	3:25	3:25	3:25
	3:30	3:30	3:30
	3:35	3:35	3:35
	3:40	3:40	3:40
	3:45	3:45	3:45
	3:50	3:50	3:50
	3:55	3:55	3:55
	4:00	4:00	4:00
	4:05	4:05	4:05
	4:10	4:10	4:10
	4:15	4:15	4:15
	4:20	4:20	4:20
	4:25	4:25	4:25
	4:30	4:30	4:30
	4:35	4:35	4:35
	4:40	4:40	4:40
	4:45	4:45	4:45
	4:50	4:50	4:50
	4:55	4:55	4:55
	5:00	5:00	5:00
	5:05	5:05	5:05
	5:10	5:10	5:10
	5:15	5:15	5:15
	5:20	5:20	5:20
	5:25	5:25	5:25
	5:30	5:30	5:30
	5:35	5:35	5:35
	5:40	5:40	5:40
	5:45	5:45	5:45
	5:50	5:50	5:50
	5:55	5:55	5:55
	6:00	6:00	6:00
	6:05	6:05	6:05
	6:10	6:10	6:10
	6:15	6:15	6:15
	6:20	6:20	6:20
	6:25	6:25	6:25
	6:30	6:30	6:30
	6:35	6:35	6:35
	6:40	6:40	6:40
	6:45	6:45	6:45
	6:50	6:50	6:50
	6:55	6:55	6:55
	7:00	7:00	7:00
	7:05	7:05	7:05
	7:10	7:10	7:10
	7:15	7:15	7:15
	7:20	7:20	7:20
	7:25	7:25	7:25
	7:30	7:30	7:30
	7:35	7:35	7:35
	7:40	7:40	7:40
	7:45	7:45	7:45
	7:50	7:50	7:50
	7:55	7:55	7:55
	8:00	8:00	8:00
	8:05	8:05	8:05
	8:10	8:10	8:10
	8:15	8:15	8:15
	8:20	8:20	8:20
	8:25	8:25	8:25
	8:30	8:30	8:30
	8:35	8:35	8:35
	8:40	8:40	8:40
	8:45	8:45	8:45
	8:50	8:50	8:50
	8:55	8:55	8:55
	9:00	9:00	9:00
	9:05	9:05	9:05
	9:10	9:10	9:10
	9:15	9:15	9:15
	9:20	9:20	9:20
	9:25	9:25	9:25
	9:30	9:30	9:30
	9:35	9:35	9:35
	9:40	9:40	9:40
	9:45	9:45	9:45
	9:50	9:50	9:50
	9:55	9:55	9:55
	10:00	10:00	10:00

Guy W. Rogers
2nd Lt., Aviation Section, Sc.,
Adjutant.

Cadet Corps.

6. BARRACKS:

As noted above, when the school opened the University had available no quarters for the men who first arrived. Until June 30, 1917, they lived in near by fraternity and boarding houses, a commutation of $5.00 per man per month being allowed by the Government to cover the cost of quarters. July 1, 1917 the Government executed a lease on a brick building near the campus to be used as barracks for the cadets and they moved into this building on July 1, 1917. The lease on this building was for one year and it was vacated on June 30, 1918 although in the meantime several additional barracks had been built by the University to handle the increased size of the school. This brick barracks had a capacity of 260 men when crowded although this was considerably in excess of its capacity when allowing fifty square feet of floor space per man.

The University had available no buildings which could be used for barracks and for several months could not see its way clear financially to construct any barracks. Upon the statement of the Government, however, that all other Schools of Military Aeronautics were making provision for barracks out of tuition fees or else had barracks available, this University finally decided in October and November, 1917, upon construction of wooden frame buildings for this purpose. The first unit built was known as "C" barracks, a picture of this building being shown on page 283. This was a two story structure the lower floor being occupied by the mess hall, signalling laboratory, quartermaster's store room, showers and lavatory facilities. The upper story was used as sleeping quarters and had a capacity of 220 men, a picture of the sleeping quarters being shown on page 284. This building was completed the early part of November 1917. With the brick barracks, which was still in use, this gave a capacity of approximately 450 to 500 men, and by using the open courts of the Mining Building of the University, a total capacity of approximately 600 men could be accommodated as the Mining Building could easily hold from 120 to 180 men.

In January, 1918, the University adopted its plan for future barracks construction which was to concentrate all additional barracks in one group on the campus and to build them as needed in units having a capacity of approximately 100 men each; in fact the capacity originally planned for these buildings was from 110 to 120 each. These buildings were know as the campus barracks of the S.M.A. and were assigned letters as completed from "D" to "I" inclusive and were completed and ready for occupancy as follows:

D - February 2, 1918
E - February 23, 1918
F - March 29, 1918
G - June 1, 1918
H - June 15, 1918
I - July 5, 1918.

In October, 1917, the Government requested the University to relieve it of the lease on the brick barracks as soon as possible. The University did not feel financially able to do this, however, so the Government continued the lease until

A. Barracks:

A noted score, when the school opened the University had available no quarters for the men who first arrived. Until June 30, 1917, they lived in some by finding and hunting rooms, a consumption of $4.50 per man per month being allowed by the Government to cover the cost of quarters. July 2, 1917 the Government executed a lease on a brick building near the campus to be used as barracks for the cadets and they moved into this building on July 1, 1917. The lease on this building was for one year and it was renewed on June 30, 1918 although in the meantime several additional barracks had been built by the University to handle the increased size of the school. This brick barracks has a capacity of 300 men when crowded although this was considerably in excess of its capacity when Bliewhitzity square feet of floor space per man.

The University had available no buildings which could be used for barracks and for several months could see its way clear financially to constructs any barracks. Upon the statement of the Government, however, that all other schools of military instruction were making provision for barracks and if Indiana does or else had barracks available, this University finally decided to build one Summer, 1917, upon construction of wooden frame buildings for this purpose. The first such built was known as "D" barracks, a picture of this building being shown on page 293. This was a two story structure the lower floor being occupied by the mess hall, signalling laboratory, quartermaster's store room, showers and laundry facilities. The upper floor was used as sleeping quarters and had a capacity of 180 men, a picture of the sleeping quarters being shown on page 294. This building was completed the early part of October 1917. With the brick barracks, which was still in use, this gave a capacity of approximately 480 to 500 men, and by using the gym course of the dining building of the University, a total capacity of approximately 600 men could be accommodated in the dining building could easily hold from 400 to 180 men.

In January, 1918, the University adopted the plan for future barracks construction which was to accommodate all additional barracks in one group on the campus and to build them as needed in units having a capacity of approximately 100 men each, in fact the capacity originally planned for these buildings was from 100 to 120 each. These buildings were known as the Omega barracks of the U.S.A. and were designed letters as designated from "D" to "I" inclusive and were completed and ready for occupancy as follows:

D - February 2, 1918
E - February 25, 1918
F - March 29, 1918
G - June 1, 1918
H - June 15, 1918
I - July 5, 1918.

In October, 1917, the Government requested the University to relieve it of the lease on the brick barracks as soon as possible. The University did not feel financially able to do this, however, so the Government continued the lease until

Plate No. 52 - C Barracks - exterior view.

Plate No. 53 - C. Barracks - Interior view.

it expired on June 30, 1918. On the latter date the brick barracks was given up inasmuch as the University then had sufficient barracks capacity to take care of the entire enrollment.

In July, 1918, when the size of the school was at its maximum, barracks capacity as follows was available. "C" barracks 220, "D", "E", "F", "G", "H" and "I" barracks 100 each, or 600 total, and the courts of the Mining Building which could be used for temporary overflow having a capacity of 120 to 180, making a total capacity of from 940 to 1000 men. The maximum active enrolled strength of the school was 940 in July 1918.

Upon receipt of the instructions in Memorandum 291 in March, 1918, stating that each man should have a minimum of fifty square feet floor space, and upon installation of the signalling equipment in each of the campus barracks, the capacities were reduced to approximately 85 men each. Since July, 1918, however, the enrollment in the school decreased very much and the University has always since then had sufficient capacity for the School of Military Aeronautics. The picture on page 286 shows the group of campus barracks including the engine test building, referred to as building No. 5 in an earlier part of this report. The buildings in the rear were the S.A.T.C. barracks and the business district of the City of Berkeley is shown in the background. The picture on page 287 is an interior view of one of the campus barracks, this picture showing one half of one unit the others all being constructed along similar lines.

In the latter part of 1918, "C" barracks was turned over to the Vocational Training School and the School of Military Aeronautics was concentrated in the campus barracks. This proved a much better arrangement for the school from the point of view of the administrative officers stationed at the barracks. Administrative offices of the Drill and Discipline Department, which formerly had been located in a small building near "C" barracks, were moved in September 1918 to "D" barracks in the campus group which had been partitioned off to provide office space and space for the quartermaster's store room and for the post exchange. Inasmuch as the main administrative offices of the school had recently been moved to Hilgard Hall this arrangement was very satisfactory in concentrating all the buildings used by the school, with the exception of the laboratory, within a very limited aera. In October, 1918, "E" barracks was sub-divided, one half of the building being turned over to the medical research unit and the other half still being used for barracks purposes. The elimination of "C" barracks, "D" barracks and one half of "E" barracks accordingly reduced the available barracks capacity of the school. However, it was planned to build additional units in the campus group as soon as increased enrollment in the school made it necessary, and plans were under consideration for the erection of a two story unit in this group at the time the armistice was signed.

The barracks were heated by gas floor furnaces and by coal stoves, which proved fairly satisfactory for this type of building in this climate.

The showers and lavatory facilities were installed in "C" barracks when it was originally constructed. Upon rearrangement of the mess, however, in the early part of 1918, the shower room was eliminated and from that time on the cadets of the

it expired on June 30, 1919. On the latter date the brick barracks was given up because as the University then had sufficient barracks capacity to take care of the entire enrollment.

In July, 1919, when the size of the school was at its maximum, barracks capacity in Fowler and Avalon. "A" barracks had, "B", "C", "D", "E", "F", "G", "H" barracks 100 each, or 800 total, and the quarts of the Engineering building which could be used for temporary sleeping buildings a capacity of 192 in 192, making a total capacity of 1000 men. The maximum active enrolled strength of the school was 940 in July 1918.

Upon receipt of the instructions in November 1918 in March, 1919, setting that each man should have a minimum of fifty square feet floor space, and upon installation of the sleeping equipment in each of the barrack barracks, the capacities were reduced to approximately 60 men each. Since July, 1919, however, the capacity of the school decreased very much and the University has always since had sufficient capacity for the School of Military Aeronautics. The picture on page 102 shows the group of barracks including the barrack that building, referred to as building No. 8 in an earlier part of this report. The buildings in the rear were the [illegible], barracks and the machine hangars of the Army of Occupation in Germany. The picture on page 107 is a bird's eye view of one of the camps barracks, this picture showing one half of one hangar the others all being constructed along similar lines.

In the latter part of 1918, "D" barracks was turned over to the Provisional Training School for the School of Military Aeronautics and commencing in the Spring [illegible]. This proved a much better arrangement for the school from the point of view of the administrative officers stationed at the barracks. Administrative offices of the Civil and Industrial Department, which formerly had been located in a small building near "C" barracks, were moved in September 1918 to "D" barracks in the larger group which had been partitioned off to provide office space and space for the quartermasters store room and for the post exchange. Inasmuch as the main administrative office of the School had formerly been moved to Hilgard Hall this arrangement was very satisfactory in concentrating all the building used by the school, with the exception of the laboratory, within a very limited area. In January, 1918, "H" barracks was constructed, the half of the building being turned over to the Medical Department and the other half still being used for barracks purposes. The division of "G" barracks, "H" barracks and the half of "E" barracks provided the building barracks capacity of the School. Later, it was planned to build additional units in the camps group as soon as increased enrollment in the School made it necessary, and plans were under consideration for the erection of a two story unit in this group at the time the armistice was signed.

The barracks were heated by gas floor furnaces and by coal stoves, which proved fairly satisfactory for this type of building in this climate.

The mess and dining facilities were included in "D" barracks when it was originally constructed. Upon rearrangement of the unit, however, in the early part of 1918, the mess was eliminated and from that time on the cadets of the


No. 4 Eng. Lab.
G.
H
I
K.
F
E
D.

Plate No. 54 - S. M. A. Campus Barracks - S. A. T. C. Barracks
and City of Berkeley in Background.

Plate No. 55 - S. M. A. Campus Barracks Unit - interior view

Cadet Corps.

School of Military Aeronautics had the use of showers, towels, etc. in the University gymnasium located a short distance from the barracks. When the campus units were constructed the same arrangement regarding showers was made and separate buildings were provided for lavatory facilities.

7. MESS:

When the school opened in May, 1917, no facilities other than local boarding houses and restaurants were available for messing the cadets of the School of Military Aeronautics. A mess was started by a private individual in a building near the brick barracks and the majority of the cadets ate at this place, being charged $1.00 per day. The mess was not satisfactory in any respect and on December 1, 1917 the University assumed control of the mess continuing to operate it in the basement of Stiles Hall, a brick building next door to the brick barracks. The mess was operated directly under the Comptroller of the University and a charge of 80¢ per man per day was made.

The mess referred to as being installed in the basement of Stiles Hall was not large enough to handle the school as it began to increase in the latter months of 1917. When "C" barracks was completed in November, 1917, additional space for the mess was provided in this building although at that time no kitchen was provided in "C" barracks, the food being carried from the kitchen in Stiles Hall located only a few feet away. Picture of the mess hall in C Barracks is shown on page 290.

In March and April of 1918 the Quartermaster's department was moved from "C" barracks to the basement of Stiles hall and the space formerly occupied by the Quartermaster in "C" barracks was taken over by the mess. A kitchen was also installed in "C" barracks and the equipment in Stiles Hall as far as the mess was concerned entirely given up. In April, 1918, the cafeteria style of mess was installed and maintained from that time until the close of the school.

Complaints have been made regarding the mess from time to time both by the cadets and by outside parties of the City of Berkeley. The mess has been frequently inspected by the Commandant, by the Post Surgeon and also by inspectors who have visited the school and no serious complaints have been made by any of these men. The Commandant has made frequent suggestions looking toward improvements in the mess and these the University has gladly received and acted upon. The following indorsement is quoted as stating the Commandant's opinion regarding the mess, this indorsement being made upon a complaint sent to Washington and referred back to the school for explanation.

" 2nd Ind.
HQ., S.M.A., Berkeley, California, July 18th, 1918 - To the Adjutant General of the Army, Washington, D. C. - Returned.

1. The course at this school is difficult and requires considerable effort on the part of the candidate to successfully complete it. It is very desirable that this should be so. These men are receiving training to become Aviation Pilots,-Officers,- and it

school or military requirements and the use of showers, towels, etc. in the university gymnasium located a short distance from the barracks. When the league rules were constructed the same arrangement regarding showers was made and separate facilities were provided for Juniors Footlights.

7. Hotel:

When the school opened in May, 1917, no facilities other than local boarding houses and restaurants were available for housing the students of the School of Military Aeronautics. A room was started by a private individual in a building near the train station and the majority of the cadets ate at this place, being charged $4.50 per day. The meals were not satisfactory in any respect and on November 1, 1917 the University assumed control of the mess contributing to upgrade it in the measure of their ability, a point worthing most note in the train station. The mess was operated directly under the supervision of the University and a charge of $4 per week for the meals.

The mess referred to as being installed in the basement of Cutler Hall was not large enough to handle the school as it began to increase in the middle of the month of 1917. Long "C" barracks was completed in November, 1917, additional space for the mess was provided in this building although at that time no kitchen was provided in "C" barracks, the food being carried from the kitchen in Cutler Hall located only a few feet away. Prior to the mess hall in 2 barracks in about so year.

In March and April of 1918 the Quartermaster's department had moved from "C" barracks to the basement of Cutler hall and the space formerly occupied by the Quartermaster in "C" barracks was taken over by the mess. A kitchen was also installed in "C" barracks and the equipment in Cutler Hall so far as the mess was concerned entirely given up. In April, 1918, the cafeteria style of mess was installed and maintained from that time until the close of the school.

Complaints have been made regarding too many flies at times both in the cadets and in outside quarter of the City of Lexington. The mess has been frequently inspected by the Commandant, by the Post Surgeon and also by inspectors who have visited the school and no serious complaints have been made by any of these men. The Commandant has made frequent suggestions looking toward improvements in the mess and there the University has gladly received and acted upon. The following improvement is quoted as stating the Commandant's opinion regarding the mess, this improvement being made upon a complaint sent to Washington and referred back to the school for explanation.

" 2nd Ind.

Ex., Ed., ... Berkeley, California, July 12th, 1918 - To the Adjutant General of the Army, Washington, D. C. - Returned.

1. The course at this school is difficult and requires considerable effort on the part of the candidate to successfully complete it. It is very desirable that this should be so. These men are receiving training to become Aviation Pilots,-Officers,- and it

Plate No. 56 - Mess Hall - lower floor of C Barracks.

is not desirable that a weakling should slip through.

2. The men are sent here as enlisted men and while here are treated as such. Their quarters are sanitary and excellent in all respects. Their food is ample, of good quality and slightly superior to that served in the average enlisted men's mess. While the refinements of serving are less than found in the better hotels and restaurants and probably less than many have been used to in their own homes, it is decidedly better than soldiers and officers are used to in the field and soldiers in cantonments. The men have dishes instead of individual mess equipment. Their dishes are washed and scalded in a dish-washer. An officer of this command is present and eats at each meal served. The menus are daily approved by the Post Surgeon. The mess is daily inspected by a surgeon; weekly inspected at a formal inspection by the Commandant and staff, with numerous inspections by the Commandant at irregular intervals.

3. The School was recently inspected by Lieut. Colonel Clifford C. Kinney and during his inspection he placed himself "in line" during the serving of the noon meal and followed a man from the time he received his tray to a table. It is not believed he found any objectionable features concerning the quality or serving of the food.

4. It is the firm belief of the Commandant that the living conditions of the candidates at this school are satisfactory in all respects, and any candidate who cannot successfully complete the course because of these conditions would never make a satisfactory officer in any military service. "

8. NUMBERS:

When the school opened in May, 1917, the plan was to send a squadron of 25 men to the school each week. Due to troubles in examining the candidates the size of the squadrons sent to the school fluctuated considerably, the first week 16 men being sent to the school, the second week 41, the third week 43, etc. Instructions were received in June, 1917, not to enroll more than an average of 25 each week and not to have more than 30 in any one squadron, hence it was necessary to hold some of these men for several days until they were able to join squadrons of the proper size. The plan was originally that the school would contain eight squadrons of 25 each or approximately 200 men. In July, 1917, information was requested by Washington regarding the possibility of increasing the school to four or five hundred. The University has always been glad to receive as large squadrons as the War Department desired to send, the only condition being that sufficient time be allowed in order to prepare barracks space and proper laboratory facilities. In

3. The men are sent here as enlisted men and while here are treated as such. Their quarters are sanitary and excellent in all respects. Their food is ample, of good quality and slightly superior to that served in the average enlisted man's mess. While the refinements of serving are less than found in the better hotels and restaurants and probably less than many have been used to in their own homes, it is decidedly better than soldiers and officers are used to in the field and soldiers in cantonments. The men have dishes instead of individual mess equipment. Their dishes are washed and scalded in a dishwasher. An officer of this command is present and eats at each meal served. The menus are daily approved by the Post Surgeon. The mess is daily inspected by a surgeon; weekly inspected at a formal inspection by the Commandant and staff, with numerous inspections by the Commandant at irregular intervals.

4. The school was personally inspected by Lieut. Colonel Gilfillan [illegible] Kinney and during his inspection he placed himself "in line" during the serving of the noon meal and followed a man from the time he received his tray to a table. It is not believed he found any objectionable features concerning the quality or serving of the food.

4. It is the firm belief of the Commandant that the living conditions of the candidates at this school are satisfactory in all respects, and any candidate who cannot successfully complete the course because of these conditions would never make a satisfactory officer in any military service."

1. [illegible]

When the second opened in May, 1917, the plan was to send a squadron of 25 men to the school each week. Due to troubles in assembling the candidates into a of the squadrons sent to the school fluctuated considerably, the first week 14 men being sent to the school, the second week 41, the third week 42, etc. Instructions were received in June, 1917, not to enroll more than an average of 25 each week and not to have more than 50 in any one squadron, hence it was necessary to hold some of these men for several days until they were able to join squadrons of the proper size. The plan was originally that the school would contain eight squadrons of 25 each or approximately 200 men. In July, 1917, information was received by Washington regarding the possibility of increasing the school to five or six thousand. The University has always been glad to receive as large numbers as the War Department desired to send, the only condition being that sufficient time be allowed in order to prepare barracks space and proper laboratory facilities. In

Cadet Corps.

September the school was advised that 45 men per week would be sent beginning September 15th, also that this number would be increased to 62 per week on November 17, 1917. While these were the numbers that it was desired to send, the entering squadrons continued to fluctuate very greatly in size the latter months of 1917 varying from 13 to 70.

In April, 1918, information was requested by Washington regarding the possibility of handling 85 men per week for a period of three months beginning May 11th, after which the size of the squadrons would again drop to 40 per week. As this was satisfactory to the University proper arrangements were made and on May 11th the first squadron of 85 men was received, approximately this number per week being received thereafter for eleven weeks.

For a period of three weeks beginning July 29th no cadets were received by this school . Following that time squadrons of from 30 to 35 were sent here for about eight weeks.

In November it was evidently the plan of the War Department to greatly increase the size of the school judging by the following notices received in October and November, 1918. Under date of October 28th the Commandant was advised that orders had been requested for the following numbers to be sent to the school:

November 9th - 50 men
" 16th - 75 "

Under date of November 6th the Commandant was advised that orders requesting the following had been sent through:

November 23rd - 75 men
" 30th -100 "

Due to the signing of the armistice these squadrons never arrived but it was evidently the plan to send squadrons of 100 men each through the winter months as the school was rated as having a capacity of 1200 men.

Appendix L1 in this report,which was compiled from the class roll records shows the following information by weeks for the entire period of operation of the school: The number of men in each squadron, the squadron letter and number, the number of men relieved from instruction and the number demoted. This appendix also shows the number entering each week and the number graduating. This data has been compiled as carefully as possible but there are no doubt some errors in the figures shown. It is believed, however, that the entrants and graduates are correct. Table 16 on the following pages summarizes the entrants, graduates and discharges by weeks from appendix L1 This table also shows the enrolled strength each week and shows the totals from the opening of the school to date of the entrants, graduates and discharged men. From this table it will be seen that the size of the school was approximately 200 men until October 1, 1917. The size began to increase from that date and was not at all uniform or of any particular size from that date on. The maximum number in the school occurred during the month of July, 1918, when

September the school was advised that 45 men per week would be sent beginning September 15th, also that this number would be increased to 60 per week on November 1st, 1917. While there were the numbers that it was desired to send, the arriving squadrons continued to fluctuate very greatly as also the latter months of 1917 varying from 15 to 75.

In April, 1918, information was received by Commander regarding the possibility of handling 80 men per week for a period of three months beginning May 15th, after which the size of the squadrons would again drop to 60 per week. As this was satisfactory to the University proper arrangements were made and on May 15th the first squadron of 80 was received, approximately this number per week being received thereafter for eleven weeks.

For a period of three weeks beginning July 29th no cadets were received at this school. Following that time squadrons of 1700 to 2 were sent here for about eight weeks.

In November 19 was received the plan of the War Department to greatly increase the size of the school, judging by the following notice received in October and November, 1918. Under date of October 28th the commanding officer was advised that orders had been received for the following numbers to be sent to this school:

November 9th - 50 men
" 16th - 75 "

Under date of November 5th the commandant was advised that orders regarding the following had been sent through:

November 23rd - 75 men
" 30th -100 "

Due to the signing of the armistice these squadrons never arrived and it was evidently the plan to send squadrons of 100 men each through the winter months as the school was rated as having a capacity of 1200 men.

Appendix 1. In this report, which was compiled from the class roll records shows the following information by weeks for the entire period of operation of the school: The number of men in each squadron, the squadron letter and number, the number of men relieved from instruction and the number remaining. This appendix also shows the number entering each week and the number graduating. This data has been compiled as carefully as possible but there are no doubt some errors in the figures shown. It is believed, however, that the authentic and probable are correct. Table 1. on the following page summarizes the authority, numbers and discharges by weeks from appendix 1. This table also shows the monthly strength and also shows the totals from the opening of the school to date of the armistice, graduates and discharged men. From this table it will be seen that the size of the school was approximately 600 until October 1, 1917. The size began to increase from that date and was not at all uniform or of any particular size from that date on. The maximum number in the school occurred during the month of May, 1918, when

School of Military Aeronautics - Berkeley

Table No 16.

Entrants, Graduated, Relieved and Enrolled Strength by Weeks.

* * * *

Week Mon.- Sat. (1)	Week No. (2)	Weekly Totals (3) Enter.	(4) Grad.	(5) Rel.	(6) Enroll. Strength	Total from opening of School to date (To end of week). (7) Enter.	(8) Grad.	(9) Rel.	Ratio of (10) Col 5 / Col 6 Pct.	(11) Col 9 / Col 7 Pct.
1917										
5/21-26	1	16	--	--	16	16	--	--	0	0
5/28 - 6/2	2	41	--	--	57	57	--	--	0	0
6/4 - 9	3	43	--	--	100	100	--		0	0
6/11-16	4	54	--	--	154	154	--		0	0
6/18-23	5	25	--	1	179	179	--	1	0.6	0.6
6/25-30	6	1	--	1	179	180	--	2	0.6	1.1
7/2 -7	7	13	--	12	193	193	--	14	6.2	7.2
7/9-14	8	26	24	2	207	219	24	16	0.8	7.3
7/16-21	9	28	25	0	209	247	49	16	0	6.2
7/23-28	10	19	34	0	204	266	83	16	0	6.0
7/30-8/4	11	30	20	1	199	296	103	17	0.5	5.7
8/6-11	12	25	23	0	202	321	126	17	0	5.3
8/13-18	13	5	22	1	185	326	148	18	0.5	5.5
8/20-25	14	41	* 20	5	205	367	168	23	1.5	5.7
8/27-9/1	15	12	25	0	191	379	193	23	0	5.5
9/3-8	16	20	29	2	187	399	222	25	1.1	5.8
9/10-15	17	51	15	3	206	450	237	28	1.5	5.8
9/17-22	18	13	21	8	201	463	258	36	4.0	7.3
9/24-29	19	38	24	7	209	501	282	43	3.3	8.2
10/1-6	20	27	18	7	207	528	300	50	3.4	9.1
10/8-13	21	46	18	2	228	574	318	52	0.9	8.7
10/15-20	22	30	12	7	237	604	330	59	3.0	9.4
10/22-27	23	70	14	6	287	674	344	65	2.1	9.3
10/29-11/3	24	47	26	11	314	721	370	76	3.5	10.3
11/5-10	25	60	21	9	338	781	391	85	2.7	10.6

* should be 21

School of Military Aeronautics - Berkeley

Table No. 17.

Entrants, Graduated, Relieved and Enrolled Strength by Weeks.

Week Ending	Week No.	Entrants	Weekly Totals: Graduated	Relieved	Enrolled	Total from opening of School to date (To end of week): Entrants	Graduated	Relieved	Ratio of Grad. to Rel.	Ratio of Grad. to Enrol.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1917										
5/21-26	1	16	--	--	16	16	--	--	0	0
5/28 - 6/2	2	41	--	--	57	57	--	--	0	0
6/4 - 9	3	43	--	--	100	100	--		0	0
6/11-16	4	24	--	--	124	124	--		0	0
6/17-23	5	53	--	1	177	177	--	1	0.0	0.0
6/24-30	6	1	--	1	172	172	2	2	1.0	1.0
7/2 -7	7	18	--	12	178	190	--	14	7.0	7.0
7/9-14	8	26	24	2	207	219	24	16	1.5	1.5
7/16-21	9	12	20	0	219	247	49	16	0	6.2
7/23-28	10	11	34	0	204	266	83	16	0	4.0
7/30-8/4	11	20	20	1	199	295	103	17	0.0	5.7
8/6-11	12	26	23	0	202	321	126	17	0	6.3
8/13-18	13	5	32	1	186	326	148	18	0.0	8.1
8/20-25	14	41	*	1	206	367	168	23	1.0	5.7
8/27-9/1	15	12	24	0	194	379	192	23	0	4.0
9/3-8	16	20	19	2	197	399	222	25	1.0	4.0
9/10-15	17	23	18	3	202	422	237	26	1.5	5.8
9/17-22	18	13	21	8	201	435	258	36	4.0	7.2
9/24-29	19	25	24	7	214	460	282	43	3.5	6.5
10/1-6	20	27	18	7	227	526	300	50	3.4	9.1
10/8-13	21	46	18	2	258	574	318	52	0.9	8.7
10/15-20	22	30	14	7	277	604	330	59	3.0	5.4
10/22-27	23	70	14	6	327	674	344	65	2.1	9.3
10/29-11/3	24	47	26	11	348	721	370	76	2.4	9.7
11/5-10	25	10	11	9	338	731	381	85	1.2	10.1

* Records lo 11

Table No. 16.

Week Mon.-Sat. (1)	Week No. (2)	Weekly Totals Enter. (3)	Grad. (4)	Rel. (5)	Enroll. Strgth. (6)	Total from opening of School to date (To end of week). Enter (7)	Grad. (8)	Rel. (9)	Ratio of Col 5 / Col 6 Pct. (10)	Col 9 / Col 7 Pct. (11)
1917										
11/12-17	26	38	26	12	344	819	417	97	3.5	11.6
11/19-24	27	54	27	10	361	873	444	107	2.8	12.0
11/26-12/1	28	71	20	3	396	944	464	110	0.8	11.5
12/3-8	29	66	23	11	438	1010	487	121	2.5	11.8
12/10-15	30	76	61	14	478	1086	548	135	2.9	12.2
12/17-22	31	75	51	5	477	1161	599	140	1.0	11.9
12/24-29	32	Vacation			421					
12/31-1/5/18	33	Vacation			421					
1918										
1/7-12	34	78	44	14	499	1239	643	154	2.8	12.2
1/14-19	35	86	31	9	528	1325	674	163	1.7	12.1
1/21-26	36	195	30	18	684	1520	704	181	2.6	11.8
1/28-2/2	37	67	72	11	702	1587	776	192	1.6	12.0
2/4-9	38	64	81	22	685	1651	857	214	3.2	12.8
2/11-16	39	68	95	12	648	1719	952	226	1.9	13.0
2/18-23	40	78	87	10	616	1797	1039	236	1.6	13.0
2/25-3/2	41	76	37	17	596	1873	1076	253	2.9	13.4
3/4-9	42	70	61	11	610	1943	1137	264	1.8	13.5
3/11-16	43	76	48	14	613	2019	1185	278	2.3	13.7
3/18-23	44	71	42	24	623	2090	1227	302	3.9	14.3
3/25-30	45	65	60	5	624	2155	1287	307	0.8	14.2
4/1-6	46	40	56	14	599	2195	1343	321	2.3	14.5
4/8-13	47	38	54	8	567	2233	1397	329	1.4	14.6
4/15-20	48	43	59	6	547	2276	1456	335	1.1	14.6
4/22-27	49	40	60	5	528	2316	1516	340	0.9	14.6
4/29-5/4	50	39	62	16	499	2355	1578	356	3.2	15.0
5/6-11	51	37	28	2	457	2392	1606	358	0.4	14.9
5/13-18	52	83	11	6	510	2475	1617	364	1.2	14.6
5/20-23	53	85	13	6	575	2560	1630	370	1.0	14.4
5/27-6/1	54	85	12	11	642	2645	1642	381	2.0	14.3
6/3-8	55	85	44	10	702	2730	1686	381	1.4	14.3
6/10-15	56	85	67	9	732	2815	1753	400	1.2	14.1
6/17-22	57	87	42	9	744	2902	1795	409	1.2	14.0
6/24-29	58	85	43	7	783	2987	1838	416	0.9	13.9
7/1-6	59	85	24	10	816	3072	1862	426	1.2	13.8

Week Ending	Weekly Totals				Total Days Attendance of School to date (To end of week).		Ratio of
	(1)	(2)	(3)	(4)	(7)	(8)	(9)
1/7-12	58	26	12	844	819	417	97	8.8	11.6
1/13-19	64	27	10	861	875	444	107	2.8	12.0
1/20-26	71	20	3	396	944	464	110	0.8	11.8
1/27-2	66	28	11	438	1010	487	121	2.8	11.8
2/3-9	76	81	14	478	1088	548	136	2.9	12.2
2/10-16	7	71	[illegible]	477	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2/17-23				481					
2/24-3/2		Vacation		421					
3/3-9	78	44	14	499	1289	642	164	2.8	12.2
3/10-16	85	81	9	528	1828	674	165	1.7	12.1
3/17-23	58	30	18	684	1820	704	181	2.6	11.8
3/24-30	67	72	11	702	1887	776	192	1.6	12.0
3/31-4/6	64	81	22	685	1851	857	214	3.2	12.8
4/7-13	68	95	12	648	1719	982	226	1.9	13.0
4/14-20	78	87	10	616	1797	1089	236	1.6	13.0
4/21-27	78	37	17	538	1875	1076	253	2.9	13.1
4/28-5/4	70	61	11	810	1943	1187	264	1.8	13.6
5/5-11	78	48	14	813	2019	1265	278	2.3	13.7
5/12-18	71	42	24	828	2090	1327	302	3.9	14.3
5/19-25	65	60	5	824	2165	1387	307	0.8	14.2
5/26-6/1	40	56	14	829	2198	1443	321	2.3	14.5
6/2-8	38	54	8	807	2283	1497	329	1.4	14.0
6/9-15	43	59	6	847	2276	1456	335	1.1	14.6
6/16-22	40	60	5	828	2316	1516	340	0.9	14.5
6/23-29	39	62	16	469	2365	1578	356	3.2	15.0
6/30-7/6	37	28	2	457	2392	1606	358	0.4	14.9
7/7-13	83	11	6	310	2475	1617	364	1.2	14.8
7/14-20	85	13	6	375	2560	1630	370	1.0	14.4
7/21-27	85	12	11	842	2645	1642	381	2.0	14.3
7/28-8/3	85	44	10	702	2730	1686	321	1.4	14.3
8/4-10	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8/11-17	87	42	9	744	2902	1728	409	1.2	14.0
8/18-24	85	43	7	783	2987	1888	415	0.9	13.9
8/25-31	85	24	10	816	3072	1892	426	1.2	13.8

Table No. 16.

Week Mon.-Sat. (1)	Week No. (2)	Weekly Totals (3) Enter.	(4) Grad.	(5) Rel.	(6) Enroll. Strgth.	Total from opening of School to date (To end of week) (7) Enter.	(8) Grad.	(9) Rel.	Ratio of (10) Col 5 / Col 6 Pct.	(11) Col 9 / Col 7 Pct.
1918										
7/8-13	60	85	33	9	868	3157	1895	435	1.0	13.7
7/15-20	61	86	40	10	912	3243	1935	445	1.1	13.7
7/22-27	62	76	37	10	940	3319	1976	455	1.1	13.6
7/29-8/3	63	--	61	6	889	3319	2033	461	0.7	13.8
8/5-10	64	--	36	5	821	3319	2069	466	0.6	14.0
8/12-17	65	--	28	10	776	3319	2097	476	1.3	14.3
8/19-24	66	35	55	6	773	3354	2152	482	0.8	14.3
8/26-31	67	32	81	11	745	3386	2233	493	1.5	14.5
9/2-7	68	32	69	5	686	3418	2302	498	0.7	14.5
9/9-14	69	33	91	11	644	3451	2393	509	1.7	14.7
9/16-21	70	29	79	7	570	3480	2472	516	1.2	14.8
9/23-28	71	27	78	7	513	3507	2550	523	1.4	14.8
9/30-10/5	72	23	65	7	452	3530	2615	530	1.6	14.9
10/7-12	73	14	50	10	394	3544	2665	540	2.5	15.2
10/14-19	74	23	60	6	361	3567	2725	546	1.7	15.2
10/21-26	75	53	17	6	349	3620	2742	552	1.7	15.2
10/28-11/2	76	42	14	7	373	3662	2756	559	1.9	15.2
11/4-9	77	33	17	4	380	3695	2773	563	1.1	15.2
11/11-16	78	41	23	2	400	3736	2796	565	0.5	15.1
11/18-23	79	4	23	11	377	3740	2819	576	2.9	15.3
11/25-30	80	1	70	94	345	3741	2889	670	27.2	17.9
12/2-7	81	--	22	14	181	3741	2911	684	7.7	18.2
12/9-14	82	--	18	15	145	3741	2929	699	10.3	18.6
12/16-21	83	--	22	1	111	3741	2951	699	0.9	18.6
12/23-28	84	Vacation			88					
12/30-1/4/19	85	Vacation			88					
1919										
1/6-11	86	--	13	3	88	3741	2964	700	3.4	18.7
1/13-18	87	--	8	4	72	3741	2972	703	5.5	18.8
1/20-25	88	--	19	1	60	3741	2991	707	1.7	18.8
1/27-2/1	89	--	40	-	40	3741	3031	708	0	18.9

Note: To correct error-week ending August 25, 1917, add one 1

Total -- 3032

Book Year Term-ination	No.	Family Tables									Total from opening of return to date (Cols 2 and 3 only)		Ratio of
		Never.	Grad.	Rel.	Left Uni.	Left Uni.	Grad.	Rel.	Left Uni.	Left Uni.	Col 5	Col 9	Col 7
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)			
1910													
7/3-13	60	30	33	3	888	3157	[illegible]	485	1.0	14.7			
7/13-20	61	34	40	10	912	3243	1938	445	1.1	13.7			
7/20-27	62	37	37	10	940	3316	1970	455	1.1	[illegible]			
7/29-3/3	63	—	1	6	889	3319	2088	421	0.7	13.1			
8/5-10	64	—	30	8	[illegible]	3310	2069	400	[illegible]	14.1			
8/12-17	65	—	28	10	775	3319	2097	476	1.3	14.1			
8/20-26	66	30	30	6	773	3384	2182	482	0.8	14.1			
8/30-31	67	3	21	11	745	3388	2223	493	1.5	14.1			
9/2-7	68	[illegible]	18	5	886	[illegible]	[illegible]	408	0.7	14.1			
9/9-14	69	13	21	11	[illegible]	3421	2295	509	1.7	14.7			
9/20-21	70	13	19	7	570	[illegible]	[illegible]	516	1.2	14.1			
9/23-28	71	17	19	7	513	3807	[illegible]	523	1.4	14.7			
9/30-10/5	72	13	10	7	452	3880	2310	450	1.6	14.3			
10/7-12	73	14	14	10	394	3944	[illegible]	540	2.5	14.1			
10/14-19	74	13	10	6	381	3987	2728	546	1.7	14.1			
10/21-26	75	18	17	6	[illegible]	3920	[illegible]	552	1.7	14.3			
10/28-11/2	76	42	14	7	373	3802	[illegible]	559	1.9	14.3			
11/4-9	77	33	17	4	380	[illegible]	2775	563	1.1	14.1			
11/11-16	78	41	23	2	400	3720	2740	555	0.5	14.1			
11/18-23	79	4	13	11	377	3740	[illegible]	576	2.9	13.3			
11/25-30	80	1	72	94	345	3741	2889	[illegible]	[illegible]	17.3			
12/2-7	81	—	22	14	181	3741	[illegible]	[illegible]	7.7	14.7			
12/9-14	82	—	18	15	146	3741	2929	589	10.3	14.3			
12/16-21	83	—	22	1	111	3741	2951	589	0.9	13.3			
12/23-28	84	Vacation			88								
12/30-1/4/13	85	Vacation			38								
1910													
1/4-11	86	—	18	3	82	3741	2964	700	[illegible]	13.7			
1/13-18	87	—	9	[illegible]	72	3741	2975	708	5.5	13.5			
1/20-25	88	—	19	1	60	3741	2981	707	1.7	13.3			
1/27-2/1	89	—	40	—	42	3741	3021	708	0	13.3			

Note: In normal current-year ending January 31, 1917, add one

Total — 1

Total — 1.0

the active enrolled strength was 940 during the week of June 22nd to 27th. The average enrollment over the period of three months from June to August inclusive was very close to 800 men.

This table shows that a total of 3741 men entered the school. Of these 3032 graduated, the remainder, 709, being discharged for various reasons. The two last columns in table 16 show:

1st The ratio of the number discharged each week to the total weekly enrolled strength. This varies from zero percent to as high as 4% (excluding the period after the signing of the armistice) and will average approximately 2%.

2nd The ratio of the total number relieved from the school to the total number who had entered up to a given date. Prior to the signing of the armistice this amounted to 15.2% which means that of the total number entering the school approximately 15.2% were relieved from instruction for one cause or another.

Table No. 17 shows the number of men graduating in each squadron beginning with squadron H-1, which graduated Saturday, July 14, 1917 up to and including squadron K-78, which graduated February 1, 1919. This list is included in order to show the number of men graduating in any particular squadron on any special day.

Included as appendix L2 is a complete alphabetical list of men who have graduated from this school giving the name, squadron number and letter with which they graduated and the date of graduation. It is possible that there are certain errors in this list in the matter of initials or graduating dates, but it is believed that the information is fairly accurate.

The chart on the following page shows the enrolled strength and graduates for each week during the operation of the school. This chart is plotted from the table included in the preceding pages and is enclosed to show the wide fluctuations in numbers through which the school went.

9. DISCHARGES:

The method of handling cadets who failed to successfully complete the course at the ground school was as follows: The Board of Examiners made a careful examination of all grades made by the candidate in question noting failures in given subjects and applied the discharge rules referred to later under which the school operated. If it was found that the candidate was subject to discharge under the rules then in effect and if there were no good reasons for doing otherwise, the Board of Examiners recommended to the Discharge Board that he be relieved from instruction. The candidate was then called up before the Discharge Board which board sat in conjunction with the Board of Examiners and Heads of Departments. The fact that the cadet had failed was then explained to him and an opportunity given him to make any statement explaining his failure that he saw fit. The cadet was then sent from the room. The Discharge Board, having all the facts before it, and having available the opinions of the Heads of Departments as to the possibility

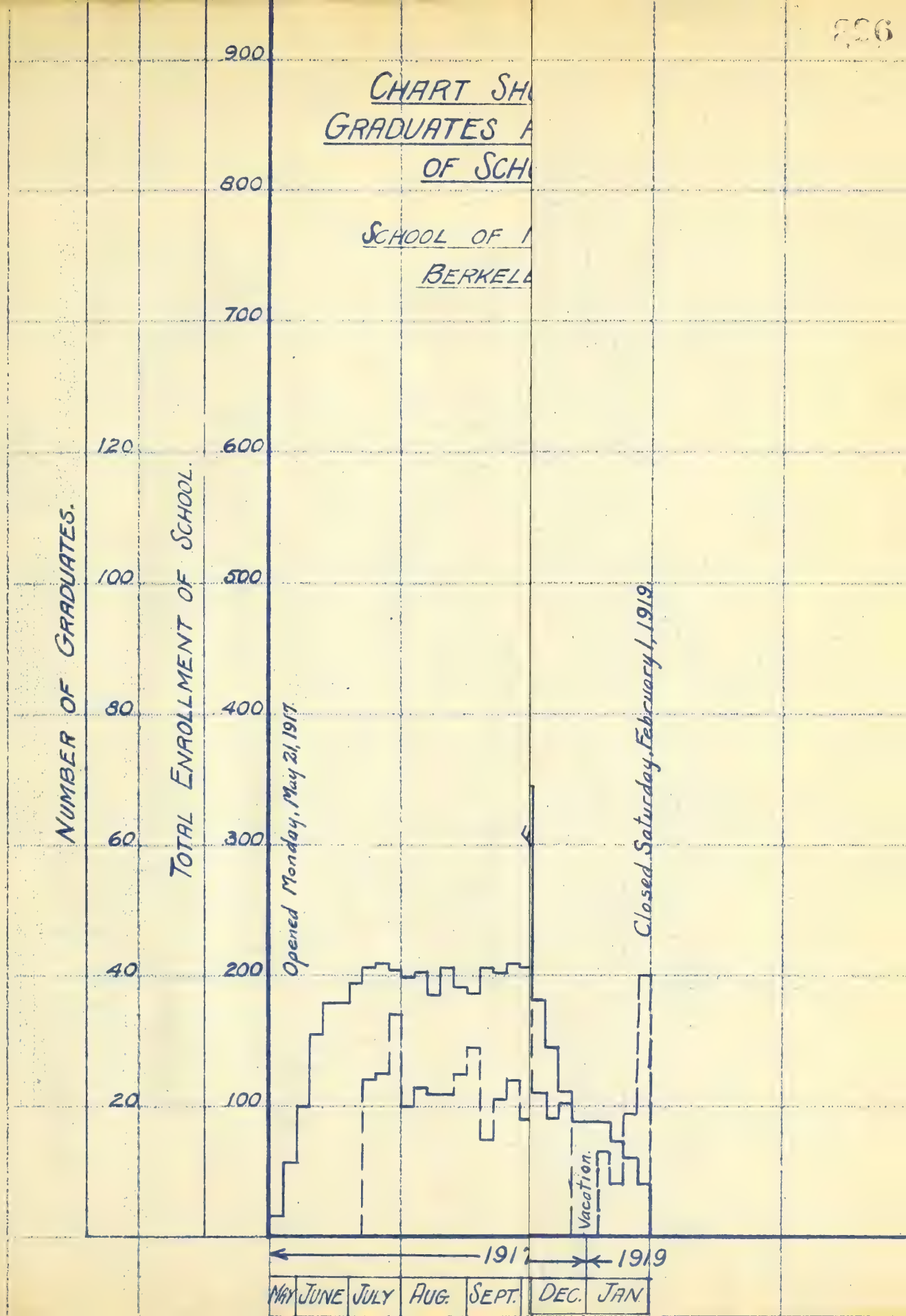


CHART SH
GRADUATES A
OF SCH
SCHOOL OF
BERKELE
NUMBER OF GRADUATES.
TOTAL ENROLLMENT OF SCHOOL.
120
100
80
60
40
20
900
800
700
600
500
400
300
200
100
Opened Monday, May 21, 1917.
Closed Saturday, February 1, 1919.
Vacation.
1917
1919
MAY
JUNE
JULY
AUG.
SEPT.
DEC.
JAN.

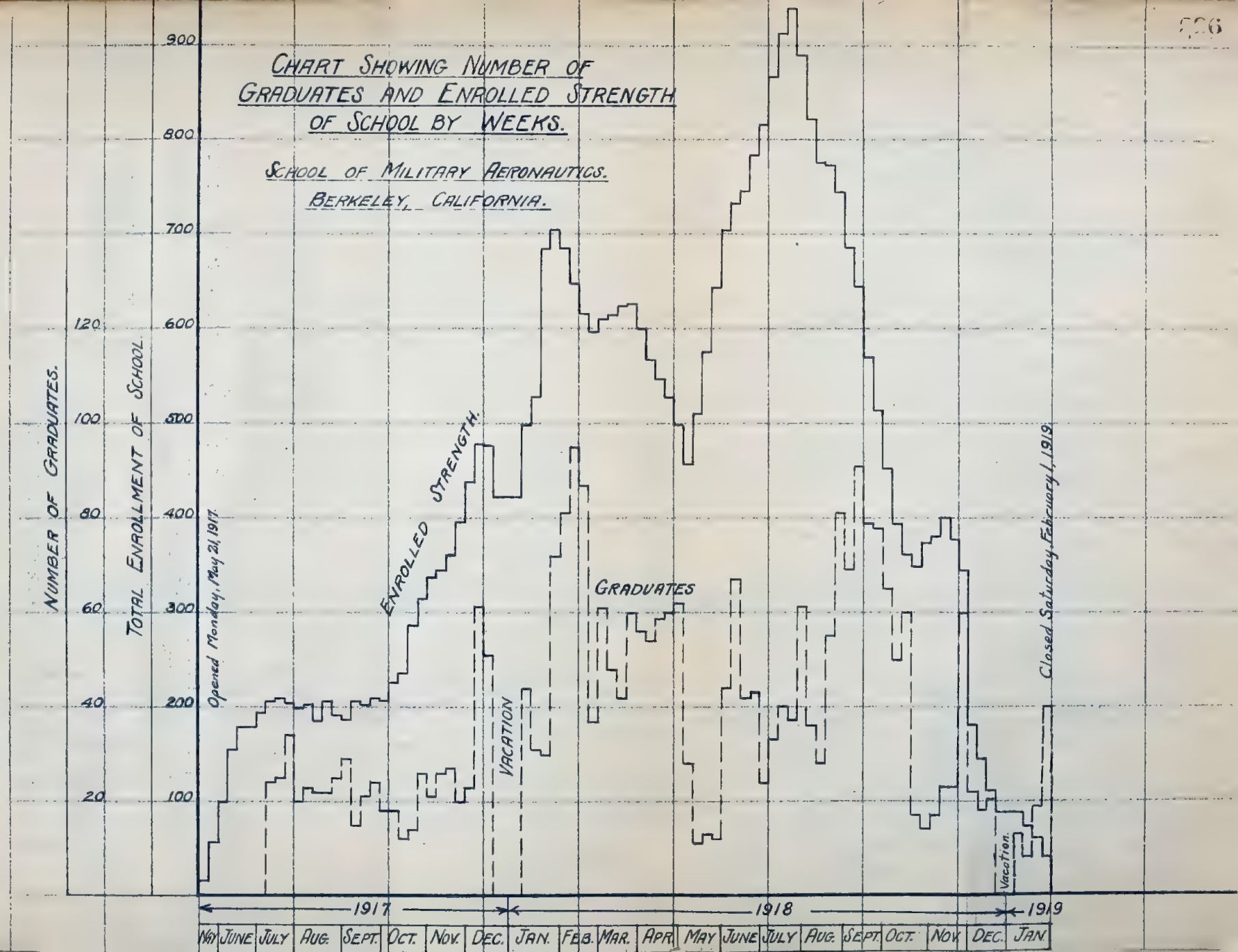


CHART SHOWING NUMBER OF GRADUATES AND ENROLLED STRENGTH OF SCHOOL BY WEEKS.
SCHOOL OF MILITARY AERONAUTICS.
BERKELEY, CALIFORNIA.
NUMBER OF GRADUATES.
TOTAL ENROLLMENT OF SCHOOL.
120
100
80
60
40
20
900
800
700
600
500
400
300
200
100
Opened Monday, May 21, 1917.
ENROLLED STRENGTH.
VACATION
GRADUATES
Closed Saturday, February 1, 1919.
Vacation.
1917
1918
1919
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
JAN.

TABLE NO. 17.

School of Military Aeronautics-Berkeley

Number of Graduates by Squadrons

Squad No.	Graduated	Saturday	Squad No.	Graduated	Saturday	Squad No.	Graduated	Saturday
H-1	24	7/14/17	H-31	87	2/23/18	M-55	91	9/14/18
H-2	25	7/21/17	H-32	37	3/2/18	M-57	79	9/21/18
H-3	34	7/28/17	H-33	61	3/9/18	M-58	78	9/28/18
H-4	20	8/4/17	H-34	48	3/16/18	M-59	65	10/5/18
H-5	23	8/11/17	H-35	42	3/23/18	M-60	50	10/12/18
H-6	22	8/18/17	H-36	60	3/30/18	M-61	60	10/19/18
H-7	21	8/25/17	H-37	56	4/6/18	M-62	17	10/26/18
H-8	25	9/1/17	H-38	54	4/13/18	M-63	14	11/2/18
H-9	29	9/8/17	H-39	59	4/20/18	M-64	17	11/9/18
H-10	15	9/15/17	H-40	60	4/27/18	M-65	23	11/16/18
H-11	21	9/22/17	I-40	62	5/4/18	M-66	23	11/23/18
H-12	24	9/29/17	H-41	7	(5/11/18	M-67	21	(11/30/18
H-13	18	10/6/17	I-41	21	(5/11/18	L-68	26	(11/30/18
H-14	18	10/13/17	K-42	11	5/18/18	K-69	23	(11/30/18
H-15	12	10/20/17	L-42	13	5/25/18	K-70	22	12/7/18
H-16	14	10/27/17	M-42	12	6/1/18	H-74(Obs)	6	(12/14/18
H-17	26	11/3/17	M-43	44	6/8/18	K-71	12	(12/14/18
H-18	21	11/10/17	M-44	67	6/15/18	K-72)	22	12/21/18
H-19	26	11/17/17	M-45	42	6/22/18	K-73)		
H-20	27	11/24/17	M-46	43	6/29/18	K-74	13	1/11/19
H-21	20	12/1/17	M-47	24	7/6/18	K-75	8	1/18/19
H-22	23	12/8/17	M-48	33	7/13/18	K-76	19	1/25/19
H-23	61	12/15/17	M-49	40	7/20/18	K-77)	40	2/1/19
H-24	51	12/22/17	M-50	37	7/27/18	K-78)		
H-25	44	1/12/18	M-51	61	8/3/18	Total	~~3034~~ 3032	
H-26	31	1/19/18	M-52	36	8/10/18			
H-27	30	1/26/18	M-52a	28	8/17/18			
H-28	72	2/2/18	M-53	55	8/24/18			
H-29	81	2/9/18	M-54	81	8/31/18			
H-30	95	2/16/18	M-55	69	9/7/18			

Table - IV.

Point of Military Jurisdiction-Corrigan

Number of Graduates by Squadrons

Squad. No.	Graduated	Squad. No.	Graduated	Squad. No.	Graduated	Squad. No.	Graduated	Squad. No.	Graduated
1	7/18	17	7/18	M-55	21	9/18	M-67	79	9/18
2	22	2/17	17	3/18	M-56	22	9/18	M-68	78
3	24	7/17	17	3/18	M-57	24	9/18	M-69	66
4	20	8/17	14	3/18	M-58	26	10/18	M-60	50
5	15	8/17	10	3/18	M-59	28	10/18	M-61	60
6	23	8/17	16	3/18	M-60	17	10/18	M-62	17
7	21	8/17	17	4/18	M-61	14	11/18	M-63	14
8	18	9/17	18	4/18	M-62	17	11/18	M-64	17
9	29	9/17	29	4/18	M-63	23	11/18	M-65	23
10	15	9/17	40	4/18	M-64	23	11/18	M-66	23
11	21	9/17	17	5/18	M-65	21	(11/18)	M-67	7
12	14	9/17	41	(5/11/18)	L-68	26	(11/30/18)	L-68	26
13	19	10/17	21	5/18	K-69	23	(11/30/18)	K-69	23
14	18	10/17	16	5/25/18	K-70	22	12/7/18	L-42	10
15	17	10/20/17	10	6/1/18	H-74 (Obe)	6	(12/14/18	L-43	10
16	14	10/17	10	6/8/18	K-71	12	(12/14/18	L-43	11
17	23	11/3/17	17	6/15/18	K-72)	22	12/21/18	L-44	11
18	21	11/10/17	17	6/22/18	K-73)			L-45	11
19	25	11/17/17	16	6/29/18	K-74	18	1/11/19	L-46	17
20	27	11/24/17	17	7/6/18	K-75	8	1/16/19	L-47	20
21	20	12/1/17	18	7/13/18	K-76	19	1/26/19	M-48	23
22	23	12/8/17	18	7/20/18	K-77)	40	2/1/19	M-49	21
23	21	12/15/17	18	7/27/18	K-78)			M-50	27
24	21	12/22/17	17	8/3/18	Total	1,000		1/22/19	M-51	24
25	24	1/12/18	17	8/10/18				1/29/18	M-52	21
26	21	1/19/18	18	8/17/18				2/5/18	M-53	30
27	30	1/26/18	18	8/24/18				2/12/18	M-54	72
28	72	2/2/18	17	8/31/18				2/19/18	M-55	21
29	21	2/9/18	21	9/7/18				2/26/18	M-56	20

of the cadet being able to make up his work, took action on his case. Some leniency has been shown where the candidate evidently had a good explanation for his failure and if he showed possibilities of becoming a good officer, but as a rule the discharge rules were interpreted fairly strictly. Copies of the principal sets of discharge rules under which the school operated are included in appendix L3 This appendix includes copy of Memorandum No. 232, dated October 30, 1917, and copy of Memorandum No. 295, dated April 3, 1918, supplementing Memorandum No. 232. Memorandum No. 340, which superseded Memorandum No. 295, is included as a part of Appendix F-7. This memorandum, in addition to revising the discharge rules, also outlined the procedure for the Rating Board mentioned earlier in this report, hence is included in an earlier appendix.

The procedure of disposing of the candidates who had been discharged from the school depended upon the branch of the service in which the candidates were enlisted. The following paragraphs quoted from letter of November 1, 1917 from the Adjutant General to the Commanding Officer of the Signal Corps Aviation School outlines the method of procedure employed at this school is disposing of candidates who failed to successfully complete the course.

> "(a) Discharge all men enlisted directly for the Aviation Section of the Signal Enlisted Reserve Corps who fail to pass the prescribed examinations and desire to be relieved from further training for commissions, reporting action to the office.
>
> (b) Men transferred to the Aviation Section Signal Corps from the Regular Army, National Guard or the National Army who fail to pass the prescribed examination and who are relieved from further training for commissions report their names to the department commander for transfer to an organization of the same arm of service, corps or department, from which transferred to the Aviation Section of the Signal Corps.
>
> (c) Men of draft age discharged by you under the foregoing instructions will be reported to their Local Boards through the Adjutant Generals of their respective states, stating cause of discharge. The home address in each case will be furnished for purpose of identification."

From the table included above under the subject of "Numbers" it will be noted that approximately 700 men were relieved from instruction at this school. This amounted to nearly 19% of the total number who entered. However, these totals include approximately 155 who were discharged following the signing of the armistice upon their own request. Prior to the signing of the armistice the number of men discharged amounted to an average of 15.2% of the total number who entered the school.

[illegible]

[illegible]

[illegible]

Cadet Corps.

10. MEDICAL CARE:

In July, 1917, arrangements were made whereby the students in the School of Military Aeronautics were to have the use and privileges of the University infirmary. This made it possible to maintain a regular schedule for typhoid and smallpox inoculations and for giving proper medical attention to all cases of sickness. An infirmary fee of 75¢ per man per month has been charged against the School of Military Aeronautics to cover the expenses incurred for the school, this being approximately the same rate as paid by the regular university students. The budget of the School of Military Aeronautics was credited with a charge of 80¢ per man per day for the number of man days actually spent at the infirmary, this credit being allowed to cover the cost of the mess which would have accrued had the man not been in the infirmary.

In February, 1918, the infirmary privileges were extended to include the officers of the school, the same fee of 75¢ per man per month being charged.

Appendix L4 of this report is a table prepared by the Post Surgeon showing the extent of sickness in the school since its beginning. It is believed that this will compare extremely favorably with the health record of any camp in the country, the only time when any large amount of sickness was prevalent being during the influenza epidemic in the fall and winter of 1918.

11. EFFECT OF THE ARMISTICE:

The signing of the armistice naturally caused considerable excitement in the personnel of the school, much curiosity being evidenced by the cadets. Some were anxious to know whether they would be required to complete the course while others were just as anxious to find out whether they would be permitted to complete the course. When authority was granted so that each man could decide whether he desired to complete the course or not, a large number of men took advantage of this opportunity and requested discharge. The actual number discharged during this period is shown in the preceding table No. 16 approximately 135 were discharged in four weeks from November 18th to December 14th inclusive, practically all of these men having requested discharge. As this was only approximately 40% of the enrolled strength on November 18th, it is believed it shows a fairly high standard of morale in the school at that time. No serious breaches of discipline have occurred since the signing of the armistice although a certain amount of relaxation was felt. Conditions were much improved, however, upon the departure of the men who had signified their intention to resign.

M. SCHOLARSHIP

1. METHOD OF GRADING:

The write-up on the Military Subjects Department contains in considerable detail the method of conducting examinations used by that department. A similar arrangement was used in all departments although possibly not outlined in such detail as shown for the Military Subjects Department. The system of grading originally used in the school was that in use by the University for its other departments, the passing mark being 70%. In October, 1917, however, the school was directed to adopt the system of grading then in use in the flying schools, which is furnished below. The passing mark under this scheme was reduced to 60%.

vg	.....90 - 100
g	.....75 - 89
f	.....65 - 74
f-	.....60 - 65
p	.....50 - 59
m	.....below 50

The rules for demotion and discharge have always been laid down by the War Department and copies of these rules are furnished in Appendix F-7 and Appendix L3.

2. RECORD OF GRADES:

Final examinations were always given in accordance with the curricula received from Washington. In addition weekly examinations were given where desirable and where authorized. The grades were submitted to Washington in the form of weekly reports for each department. These grades were compiled weekly in the office of the President of the Academic Board and examined by the Board of Examiners who noted the failures, submitting them to the Discharge Board who also recorded the honor men. The Weekly Report of Grades sent to Washington was discontinued after September 1918. A record of all grades has been kept in the school by means of a card ledger system which showed completely a man's academic record throughout his course in the school. This card ledger record was continued after the discontinuance of the weekly reports to Washington so that it was possible at any time to furnish a complete record of a man's grades.

On the following page is furnished a sample schedule of examinations which was in effect in July 1918. The final examinations under this schedule were prescribed in the curriculum. The weekly tests, however, being arranged as thought best by the Heads of Departments in consultation with the Board of Examiners.

I. [illegible]

1. [illegible] of [illegible]

The write-up on the military academic department contains in considerable detail the method of conducting examinations used by this department. A similar arrangement was used in all departments although probably not outlined in such detail as shown for the military academic department. The system of grading originally used in the school was put in use by the university for its other departments, the passing mark being 75. In October, 1917, however, the school was directed to adopt the system of grading then in use in the Army schools, which is furnished below. The passing mark under this system was reduced to 60.

vg	.....90 - 100
g	.....75 - 89
f+	.....66 - 74
f-	.....60 - 65
p	.....50 - 59
m	.....below 50

The rules for demerits and discharge have always been left blank by the Air Department and copies of these rules are furnished in appendix [illegible] and Appendix L5.

2. [illegible] of [illegible]

Final [illegible] were always given in accordance with the [illegible] furnished from headquarters. In addition weekly examinations were given where [illegible] and where authorized. The grades were submitted to headquarters in the form of weekly reports for each department. These grades were compiled weekly in the office of the President of the academic board and examined by the board of instructors who called the [illegible] to the [illegible] where the [illegible] and [illegible] men. The weekly reports of failure sent to headquarters were examined after [illegible] a record of all grades was kept in the school by means of a card index system which showed cumulatively a man's standing [illegible] the university course in the school. This card index system was continued after the discontinuance of the weekly reports to headquarters so that it was possible at any time to furnish a complete record of a man's grades.

In the following year is furnished a sample schedule of examinations which was in effect in July 1918. The final examinations under this schedule were prescribed in the regulations. The weekly tests, however, were arranged in thought best by the heads of departments in consultation with the board of instructors.

SCHEDULE OF EXAMINATIONS

Effective 7/15/18.

Squad.	Mil.Subj.	Wireless	Gunnery	Airplanes	Engines	Obs.
A	#	#		#		
B	x	x		x	#	
C	x	x	#		x	
D	x 1-hr.	x	x	x 1-hr.	x	
E		x	x			
F	x	x	x	x	x 1-hr.	
F-X						
G		x	x	x	x	
H	x 1-hr.	x	Ex. 1-hr.	x 1-hr.	x 1-hr.	#
I		x				x
K	Final	x	x			x
L		x	Ex. 1-hr.	Final		x
M		Final	Final		Final	Final

x- indicates the weeks in which tests are to be given.

#- indicates the week in which instruction begins.

[illegible]

Effective [illegible].

Group.	[illegible]	[illegible]	Gunnery	[illegible]	[illegible]	Ord.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	x	x	[illegible]	x	[illegible]	[illegible]
[illegible]	x	x	[illegible]		x	[illegible]
[illegible]	x [illegible]	x	x	x 1-hr.	x	[illegible]
[illegible]		x	x		[illegible]	[illegible]
[illegible]	x	x	x	x	x 1-hr.	[illegible]
[illegible]						[illegible]
[illegible]		x	x	x	x	[illegible]
[illegible]	x 1-hr.	x	Mx. 1-hr.	x 1-hr.	x 1-hr.	[illegible]
[illegible]		x				x
[illegible]	[illegible]	x	x			x
[illegible]	x		Final	mx. 1-hr.		x
[illegible]		Final	Final		Final	Final

[illegible] indicates the weeks in which tests are to be given.

[illegible] indicates the week in which instruction begins.

Scholarship.

3. ANALYSIS OF RECORD OF 2132 CADETS:

The following pages furnish an analytical study of 2132 cadets who have either graduated or been dicharged from the School of Military Aeronautics in Berkeley. This report was prepared by Lieutenant Walter Dreyer and is considered as being probably the most interesting data which could be included under the subject of Scholarship. This report covers approximately 57% of the total number of men who entered the school and is, therefore, sufficient on which to draw certain conclusions as indicated in the report. Lieutenant Dreyer was for several months a member of the Board of Examiners and made this study in connection with his work on the board.

1. ANALYSIS OF SOUND OF SIX SINGERS:

The following pages contain an analytical study of SIX SINGERS who have either graduated or been discovered from the School of Bill'ng Instructors in Norfolk. This report was prepared by Lieutenant Walter Dreyer and is considered as being probably the most interesting data which could be obtained under the subject of subjectivity. This report covers approximately 27, or the total number of men who entered the school and is, therefore, sufficient on which to draw certain conclusions as indicated in the report. Lieutenant Dreyer was for several months a member of the Board of Examiners and made this study in connection with his work on the board.

" AN ANALYTICAL STUDY OF 2132 MEN WHO HAVE EITHER GRADUATED OR BEEN DISCHARGED FROM THE S.M.A., BERKELEY, CALIFORNIA

(a) This study covers 2132 men who have entered the School of Military Aeronautics at Berkeley, California, and who have since either been graduated or discharged. The period covered by this study is from February 16th to December 1st, 1918. Of the 2132 men, 1827 were graduated and 227 were discharged for failure in studies, the remaining 78 being discharged for miscellaneous reasons. A study of the reasons for discharge is shown in Table M-1.

Table M-1

Reasons for Discharge	No. of Men
Academic failure	227
Cheating in examinations	4
Demoted and requested discharge	20
Dependents	15
Discipline	9
At own request (inaptitude)	11
To transfer to some other branch of service	4
Physical disability or illness	12
Business or Occupation	3
	305

(b) Deducting the number of men who were discharged for reasons other than academic failure, and re-arranging the remaining 2054 into the occupations which they followed in civil life, the results shown in Table M-2 are obtained:

Table M-2

Previous Occupation	Number Passed	No. failed Academically	Total	Percentage of failures
Auto Salesmen	68	8	76	10%
Brokers	26	2	28	7
Clerical & Banking	225	39	264	15
Dentists	--	2	2	100

" AN ANALYTICAL STUDY OF 2132 MEN WHO HAVE ENTERED THE
[illegible]
[illegible]

(a) This study covers 2132 men who have entered the School of [illegible] February 16th to December 1st, 1918. Of the 2132 men, 1827 were graduated and 307 were discharged for [illegible]. The reasons for being discharged are [illegible] charged for miscellaneous reasons. A study of the reasons for discharge is shown in Table M-1.

Table M-1

Reasons for Discharge	No. of Men
Failure in examinations	4
Demoted and requested discharge	20
Dependents	16
Discipline	9
At own request (ingratitude)	11
To transfer to some other branch of service	4
Physical disability or illness	12
Business or Occupation	3
	306

(b) Deducting the number of men who were discharged for reasons other than [illegible] Colleges, and transferring the remaining 306 into the occupations which they followed in civil life, the results shown in Table M-2 are obtained:

Table M-2

Previous Occupation	Number Trained	No. failed [illegible]	Total	Percentage of failures
Auto Salesmen	68	8	76	10%
Brokers	26	2	28	7
Clerical & Banking	225	39	264	15
Dentists	--	2	2	100

Table M-2 Continued

Previous Occupation	Number Passed	No. failed Academically	Total	Percentage of failures
Electrical Operators	4	3	7	43%
Farmers	140	25	165	15
General Executive	43	4	47	9
Lawyers	51	5	56	9
Mechanics	145	16	161	10
Merchants	29	9	38	24
Ministers	4	-	4	--
Musicians	5	2	7	29
Newspaper	22	5	27	18
Pharmacists & Physicians	10	1	11	9
Photographers	5	-	5	-
Printers	6	1	7	14
Professional Men (Technical)	128	3	131	2
Radio & Tel. Operators	5	2	7	29
Railroad Men	7	-	7	-
Salesmen	199	38	237	16
Soldiers & Sailors	13	7	20	35
Students	439	23	462	5
Surveyors & Draftsmen	60	4	64	6
Teachers	86	9	95	9
Miscellaneous	107	19	126	15
TOTALS	1827	227	2054	11%

(c) A study of the previous education of the 2054 men was made, the results of which are given in Table M-3.

Table M-3

	Passed					Failed				
	Grammar School	High School 1-2 yr.	High School 3-4 yr.	College 1-2yr.	College 3-4yr.	Gram. Sch.	H.S. 1-2	H.S. 3-4	Col. 1-2	Col. 3-4
Occupation										
Auto Salesmen	-	-	30	26	12	-	1	5	1	1
Brokers	-	1	3	6	16	-	-	2	-	-
Clerical & Banking	1	5	110	66	43	-	1	27	7	4
Dentists	-	-	-	-	-	-	-	-	1	1

Table M-2 (continued)

Previous Occupation	Number Passed	No. Failed Medical Reasons	Total	Percentage of Failures
Literary & Journalists	[illegible]	[illegible]	7	43%
Farmers	140	[illegible]	[illegible]	[illegible]
General Executive	[illegible]	[illegible]	47	9
Lawyers	51	[illegible]	56	9
Laborers	[illegible]	[illegible]	101	10
Merchants	29	9	38	24
Miners	4	-	4	-
Musicians	[illegible]	[illegible]	[illegible]	[illegible]
Newspaper	[illegible]	[illegible]	[illegible]	[illegible]
Pharmacists & Physicians	10	1	11	9
Photographers	5	-	5	-
Printers	6	1	7	14
Professional [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	128	3	131	2
Radio & Tel. Operators	5	2	7	29
Railroad Men	7	-	7	-
Salesmen	199	38	237	16
Soldiers & Sailors	13	7	20	35
Students	439	23	462	5
Surveyors & Draftsmen	60	4	64	6
Teachers	86	9	95	9
Miscellaneous	107	19	126	15
TOTALS	1827	227	2054	11%

(c) A study of the previous education of the 2054 men was made, the results of which are given in Table M-3.

Table M-3

Occupation	Passed: Grammar School	Passed: Some High	Passed: High School	Passed: Some Coll.	Passed: 1-2 Yr.	Passed: 3-4 Yr.	Failed: Grammar School	Failed: Some High	Failed: High School	Failed: Some Coll.	Failed: 1-2 Yr.	Failed: 3-4 Yr.
Auto Salesman	-	-	30	26	12	-	1	5	1	1		
Brokers	-	1	3	6	16	-	-	2	-	-		
Clerical & Banking	1	5	110	66	43	-	1	27	7	4		
Dentists	-	-	-	-	-	-	-	-	1	1		

Table M-3 Continued

Occupation	Passed: Grammar School	Passed: High School 1-2 yr.	Passed: High School 3-4 yr.	Passed: College 1-2yr.	Passed: College 3-4yr.	Failed: Gram. Sch.	Failed: H.S. 1-2	Failed: H.S. 3-4	Failed: Col. 1-2	Failed: Col. 3-4
Electrical Operators	-	1	1	2	-	-	-	3	-	-
Farmers	-	-	29	57	54	-	1	11	8	5
General Executive	-	1	17	10	15	-	-	1	1	2
Lawyers	-	-	2	3	46	-	-	1	1	3
Mechanics	1	7	83	35	19	-	1	9	4	2
Merchants	1	-	14	9	5	-	2	2	4	1
Ministers	-	-	1	2	1	-	-	-	-	-
Musicians	-	1	3	1	-	-	1	1	-	-
Newspaper	-	-	6	8	8	-	-	2	3	-
Pharmacists & Physicians	-	-	2	2	6	-	-	-	-	1
Photographers	-	-	-	2	3	-	-	-	-	-
Printers	-	-	5	1	-	-	-	1	-	-
Professional Men (Tech.)	1	3	17	16	91	-	-	2	-	1
Radio & Tel.Operators	-	-	3	1	1	-	-	2	-	-
Railroad Men	-	-	4	2	1	-	-	-	-	-
Salesmen	-	8	84	69	38	2	2	16	12	6
Soldiers & Sailors	-	-	3	6	4	-	-	2	4	1
Students	-	-	32	237	170	-	-	6	12	5
Surveyors & Draftsmen	-	1	22	22	15	-	-	4	-	-
Teachers	-	-	12	18	56	-	-	3	3	3
Miscellaneous	2	4	49	42	10	1	-	15	1	2
TOTALS -	6	32	532	643	614	3	9	115	62	38

(d) A study of previous education, without considering occupation is given in Table M-4. There is a very noticeable decrease in the percentage of failures as the educational qualifications become better.

Table M-4

Education	Total Passing	Total Failing	Percentage Failing
Grammar School	6	3	33%
1-2 years High School	32	9	22%
3-4 " " "	532	115	18%
1-2 " College	643	62	9%
3-4 " "	614	38	6%

Table 4-1 (Continued)

Occupation	Passed: Grammar	Passed: High School 1-2 yrs.	Passed: High School 3-4 yrs.	Passed: College 1-2 yrs.	Passed: College 3-4 yrs.	Failed: Gram.	Failed: H.S. 1-2 yrs.	Failed: H.S. 3-4 yrs.	Failed: College 1-2 yrs.	Failed: College 3-4 yrs.
Physicians (practicing)	-	1	1	2	-	-	-	-	-	-
Nurses	-	-	29	57	54	-	1	11	3	-
Commercial travelers	-	1	17	10	15	-	-	1	3	-
Lawyers	-	-	2	3	4o	-	-	-	1	-
Teachers	1	-	41	25	11	-	-	3	2	-
Merchants	1	-	11	1	1	-	-	3	3	-
Dentists	-	-	1	-	-	-	-	-	-	-
Engineers	-	1	1	1	-	-	-	-	-	-
Secretaries	-	-	1	1	1	-	-	-	-	-
Pharmacists & druggists	-	-	1	-	1	-	-	-	-	-
Photographers	-	-	-	-	1	-	-	-	-	-
Painters	-	-	5	1	-	-	-	1	-	-
Professional men (Tech.)	1	3	17	-	1	-	-	-	-	-
Radio & Tel.Operators	-	-	5	1	1	-	-	-	-	-
Railroad men	-	-	4	-	-	-	-	-	-	-
[illegible]	-	1	9	1	1	-	-	-	-	11
[illegible]	-	-	-	-	1	-	-	-	-	-
[illegible]	-	-	32	53	17	-	-	-	-	1o
[illegible]	-	1	-	3	-	-	-	-	1	-
Farmers	-	-	12	1	-	-	-	-	-	-
[illegible]	-	-	-	-	-	-	1	-	-	1
Totals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(d) A study of previous education, without considering occupation [illegible] the educational qualifications become better.

Table II-4

Occupation	Total Passed	Total Failed	Percentage Failed
Grammar School	6	5	33%
1-2 years High School	32	9	22%
3-4 " " "	552	115	18%
1-2 " College	643	62	8%
3-4 " "	614	38	5%

Comparison of Results of Investigation at S.M.A., Berkeley, with Results of Similar Investigation at S.M.A., Austin, Texas.

(e) A similar investigation had been made at the School of Military Aeronautics, Austin, Texas, which considered the names of 1445 men. Table M-5 shows a comparison of the results obtained:

Table M-5

Previous Occupation	Austin S.M.A. Total No. Men	Austin S.M.A. Failures	Berkeley S.M.A Total No. Men	Berkeley S.M.A Failures
Auto Salesmen	73	25%	76	10%
Mechanics	69	24	161	10
Clerical	230	22	264	15
Farmers	63	16	165	15
General Executive	46	10	47	9
Lawyers	50	6	56	9
Printers	8	38	7	14
Professional	133	2	131	2
Students	363	4	462	5
Salesmen	96	25	237	16
Teachers	33	0	95	9

(f) If the occupations alone be considered and listed in the order of merit, the following table results. All classes having a percentage of failure greater then 11% fall below the average for the 2054 men.

Table M-6

Occupation	No. of Men	Percent Failures	Occupation	No.of Men	Percent Failures
1. Railroad Men	7	0%	13. Auto Salesmen	76	10%
2. Photographers	5	0	14. Printers	7	14
3. Ministers	4	0	15. Clerical & Banking	264	15
4. Professional Men	131	2	16. Farmers	165	15
5. Students	462	5	17. Miscellaneous	126	15
6. Surveyors & Draftsmen	64	6	18. Salesmen	237	16
7. Brokers	28	7	19. Newspaper	27	18
8. Teachers	95	9	20. Merchants	38	24
9. Lawyers	56	9	21. Musicians	7	29
10. General Executive	47	9	22. Radio & Tel. Oper.	7	29
11. Phar. & Physicians	11	9	23. Soldiers & Sailors	20	35
12. Mechanics	161	10	24. Electrical Operators	7	43
			25. Dentists	2	100

Comparison of Results in Investigations [illegible],
with Results of similar Investigation at S.M.A., Austin, Texas.

(a) A similar investigation has been made on the General [illegible] Austin, Texas, [illegible] the [illegible] of the [illegible] and shows a comparison as follows [illegible]:

Table M-5

Category	Austin, S.M.A. Total No. Men	Austin, S.M.A. Total Failures	Southern [illegible] Total No. Men	Southern [illegible] Total Failures
Auto Salesmen	73	26%	76	10%
Investigator	[illegible]	[illegible]	[illegible]	[illegible]
Clerical	[illegible]	22	264	[illegible]
Laborer	[illegible]	16	165	[illegible]
Service [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lawyers	[illegible]	4	[illegible]	[illegible]
Drivers	[illegible]	[illegible]	7	[illegible]
Clerical [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Salesmen	[illegible]	[illegible]	[illegible]	[illegible]
Physicians	[illegible]	22	[illegible]	[illegible]
Teachers	[illegible]	0	[illegible]	[illegible]

(b) If the analysis shown in Table (a) and listed in the above [illegible] results, the following table results. All classes having a percentage of failure greater than 11% fall below the average for the 2054 men.

Table M-6

Occupation	No. of Men	Percent Failures	Occupation	No. of Men	Percent Failure
1. [illegible]	7	0%	13. [illegible]	[illegible]	[illegible]
2. [illegible]	5	0	14. [illegible]	7	14
3. Ministers	4	0	15. Clerical & Banking	[illegible]	11
4. [illegible]	[illegible]	0	16. [illegible]	[illegible]	11
5. [illegible]	[illegible]	0	17. [illegible]	[illegible]	12
6. [illegible]	[illegible]	0	18. Salesmen	[illegible]	1
7. [illegible]	12	0	19. [illegible]	[illegible]	12
8. [illegible]	[illegible]	[illegible]	20. [illegible]	[illegible]	14
9. Lawyers	[illegible]	0	21. Musicians	7	[illegible]
10. General Executive	47	9	22. Radio & Tel. Oper.	[illegible]	20
11. Phar. & Physicians	11	9	23. Soldiers & Sailors	[illegible]	18
12. Mechanics	161	10	24. Electrical Operators	7	[illegible]
			25. Dentists	[illegible]	[illegible]

(g) Table M-7 was made to show in terms of percentages how education improves the opportunity for graduation in each profession. The average percentage of failure for each occupation is shown in the first column. The remaining columns show the percentage of failures in each occupation according to their previous education. (Example) 10% of the professional men having 3-4 years high school failed, but only 1% of those having 3-4 years college failed. It will be noted that the general trend is a reduction below the average for the better qualified classes.

Table M-7

Percentage Failures

Occupation	Percent Failures	Grammar School	High School 1-2 yrs.	High School 3-4 yrs.	College 1-2 yrs.	College 3-4 yrs.
Professional	2%	-	-	10%	-	1%
Students	5	-	-	16	5%	3
Surveyors & Draftsmen	6	-	-	15	-	-
Teachers	9	-	-	20	14	5
Lawyers	9	-	-	33	25	6
General Executive	9	-	-	6	9	12 #
Mechanics	10	-	12	10	10	10
Auto Salesmen	10	-	1	14	4	8
Clerical & Banking	15	-	17	20	10	9
Farmers	15	-	100	28	12	8
Miscellaneous	15	33	-	23	2	17 #
Salesmen	16	100	25	16	15	14

- The percentages show an increase in failures for the college men above the average percentage of failures for the classes of "General Executive" and "Miscellaneous". This is due to the small number of men having these qualifications, as one additional failure causes a considerable percentage increase. See Table M-3 for actual number of men.

(h) Conclusions

mA study of Table M-4 would lead to the natural conclusion that regardless of occupation the man with the greater amount of education had the better chance of completing his course.

A study of Table M-6, disregarding the occupations where only a few men are listed, shows that the occupations which require either resource or technical ability provide the smaller percentage of failures. The occupations which require more or less routine work, or physical work, provide the greater number of failures, as might be expected.

A study of Table M-7, which considers both previous education and previous occupation, also shows that the higher the education the less the chance for failure. In each case, (excepting "General Executive" and "Miscellaneous") the percentage of failurs decreases as the educational qualifications increase. "

Table M-7

Percentage Failures

	Percent Failures	Grammar School	High School	College
Professional	2%	-	-	-
Students	5	-	-	-
[illegible]	[illegible]	-	-	-
Teachers	9	-	-	-
Lawyers	9	-	-	-
Unusual [illegible]	[illegible]	-	-	-
Mechanics	10	-	12	[illegible]
Auto Salesmen	10	-	1	[illegible]
Clerical & Banking	15	-	17	[illegible]
Farmers	15	-	100	[illegible]
Miscellaneous	15	33	-	[illegible]
Salesmen	16	100	25	[illegible]

above the average percentage of failures for the classes of "General Executive" and "Miscellaneous". This is due to the small number of men having these qualifications, as one additional failure causes a considerable percentage increase. See Table M-3 for actual number of men.

better chance of completing his course.

A study of Table M-6, disregarding the occupations where only a few men are listed, shows that the occupations which require [illegible] ability [illegible] percentage of failures. The occupations which require more or less routine work, or physical work, provide the greater number of failures, as might be expected.

A study of Table M-7, which considers both previous education and [illegible] shows that the higher the education the [illegible] [illegible] percentage of failure decreases as the educational qualifications increase."

N -- FINANCIAL RECORD

1. METHOD OF FINANCING.

For several weeks after the School of Military Aeronautics opened in May, 1917, the method of financing remained in doubt, as no agreement was reached on this point for some time. This left the University in some doubt as to the funds available for the proper development of the School. Originally it was proposed to pay a tuition fee to the University of fifty dollars for each cadet receiving instruction. It was finally decided, however, as shown in the contract enclosed elsewhere in this report, to pay ten dollars per week for each of the first four weeks of instruction and five dollars per week for each succeeding week. Under the eight weeks' curriculum there was also a provision in the contract which specified that in no case was the total tuition paid for instruction to be greater than sixty-five dollars per man. This provision, however, was eliminated when the twelve weeks' curriculum was started.

As outlined in the contract, the University has provided all funds for the payment of instructors, laboratory assistants and others necessary for the operation of the School, with the exception of salaries for officers stationed here by the War Department. The University has also provided funds for such buildings as were necessary and for all equipment provided for the proper operation of the School with the exception of such special equipment as the War Department has furnished.

2. FINANCIAL HISTORY OF THE SCHOOL.

The following pages include a report on the financial history of the School prepared by Lieutenant Howard L. McLean, Chairman of the Budget Committee, showing in particular the method adopted to keep a proper record and segregation of the expenditures and receipts of the School of Military Aeronautics. This report includes a sample financial report which has been submitted by the Chairman of the Budget Committee every month since this committee was appointed.

Following this financial history of the School is included a statement of the receipts and expenditures up to and including January 31, 1919. This latter statement shows a debit balance of approximately thirty-five thousand dollars. The estimated budget for February, 1919, amounted to forty-six hundred dollars, which would bring the debit balance to approximately forty thousand dollars. The salvage of buildings and equipment will probably amount to ten or twelve thousand dollars, leaving a net deficit when the School has finally closed of about thirty thousand dollars. Complete figures are not available at the time this report is being completed as the expenses are not yet in and the final audit of the books has not been made.

Included as a part of Lieutenant McLean's Report is a chart showing the monthly receipts and expenditures from the opening of the School until practically the closing date.

FINANCIAL HISTORY of the SCHOOL

From the standpoint of the University the school was considered as a department and as such had its accounting done under the Comptroller of the University. It was early found by the President of the Academic Board that it was necessary to keep in much closer touch with expenditures and to know them in greater detail than was possible when depending entirely upon the accounting department. Accordingly, in August, 1917, a committee known as the Budget Committee was appointed consisting of H. L. McLean and J. A. Polhemus. Mr. Polhemus later resigned and G. M. Thomas and R. L. Underhill, accountant, were appointed.

The duty of the committee was to make a monthly report to the President of the Academic Board upon

(a) Total receipts and expenditures from May 21, 1917, when the school was opened, to the month of the report.

(b) Receipts and expenditures for the month of the report.

(c) Expenditures by departments for the month of the report.

(d) A budget for the succeeding month.

In order to do this properly, the committee found it necessary to have full control of all financial matters. All requisitions and orders for material or for work to be done and all charges against Aeronautics by other departments of the University had to be approved by the Committee.

In making up reports it was of course necessary to do a considerable amount of estimating as bills were never all in and paid by the end of each month so that it is not to be expected that reports from one month to another will check.

A typical monthly report is the one following. It is to be noted that there was a considerable reduction in the expenditures by departments due to the signing of the armistice.

January 21, 1919.

From: Budget Committee.

To: President, Academic Board, U.S.S.M.A., Berkeley

Subject: Financial report for the month of December, 1918.

1. The financial report is submitted in the usual form:
(a) Total receipts and expenditures from May 21, 1917 to December 31, 1918.
(b) Receipts and expenditures for the month of December, 1918.
(c) Expenditures by departments for the month of December, 1918.
(d) Budget for the month of January, 1919.

2. During the influenza epidemic in October and November, "C" barracks was used as a hospital for a period of about a month. Rent was paid to the school by the Medical Emergency Budget for the use of the building. Nine hundred dollars of the income from rent in November is from this source. The large item for construction and repair in November is due to the remodeling of "E" barracks for the Medical Unit. This cost approximately $1,100.00. The differences between budget allowances and actual charges in November and December for buildings and barracks is due to a redistribution of the cost of lavatory units among the various barracks and also in two cases (Building #5 and Barracks I) to a determination of the exact cost.

3. This report shows a debit balance for the period of May 21, 1917, to December 31, 1918, of about $31,600.00. Of this the approximate amount yet to be written off for building construction is $7,000.00. The budget for January shows a debit balance of about $5,500.00.

Howard L. McLean,

HLMcL/LD

Chairman, Budget Committee.

January 21, 1919.

From: Budget Committee.

To: President, Academic Board, U.S.M.A., Berkeley

Subject: Financial report for the month of December, 1918.

1. The financial report is submitted in the usual form:

(a) Total receipts and expenditures from July 1, 1917 to December 31, 1918.
(b) Receipts and expenditures for the month of December, 1918.
(c) Expenditures by departments for the month of December, 1918.
(d) Budget for the month of January, 1919.

2. During the influenza epidemic in October and November, 70 barracks were used as a hospital for a period of about 4 weeks. This was paid in the manner by the Medical Emergency Budget for the use of the building. Nine hundred dollars of the income from rent in November is from this source. The large item for construction and repair in November is due to the remodeling of "E" barracks for the Medical Unit. This cost approximately $1,100.00. The difference between budget allowances and actual charges in November and December for buildings and barracks is due to a readjustment of the work of lavatory units among the various barracks and also in two cases (Building 45 and Barracks I) to a determination of the exact work.

3. This report shows a debit balance for the period of May 1, 1917, to December 31, 1918, of about $11,000.00. If this the appropriation account yet to be written off for building transactions is $7,000.00. The budget for January shows a debit balance of about $5,500.00.

Howard L. Holman,

H.L.H./jb Chairman, Budget Committee.

FINANCIAL STATEMENT

This statement shows receipts and expenditures from May 21, 1917, to December 31, 1918, estimated where necessary.

RECEIPTS

Period from May 21 to Nov. 30	251,139.59
Week Ending Dec. 7	1,066.44
" " Dec. 14	722.83
" " Dec. 21	557.14
" " Dec. 28	-
Period " Dec. 31	-
Total tuition	253,486.00
Charges for lost and damaged property	631.78
Mess allowance for cadets confined in infirmary	3,460.40
Rent "C" Barracks	2,027.83
Misc. Receipts	263.94
	259,869.95
Debit balance	31,631.17
	291,501.12

FINANCIAL STATEMENT

This statement shows receipts and expenditures from May 21, 1917, to December 31, 1918, authorized where necessary.

RECEIPTS

Period from May 21 to Nov. 30	261,189.59
Week ending Dec. 7	1,066.44
" " Dec. 14	722.85
" " Dec. 21	651.14
" " Dec. 28	-
Period " Dec. 31	-
Total receipts	265,630.02

Charges for lost and damaged property	141.75
Mess allowance for cadets confined in infirmary	5,140.40
Less "L" receipts	5,027.65
Net, receipts	265.34
	265,365.36
Cash balance	21,831.17
	291,501.12

EXPENDITURES

May 21, 1917 to December 31, 1918.

Staff of instruction	1	$ 114,949.83
Office staff	2	9,618.64
Commandant) to June 30, 1918	2a	3,378.32
President)	2b	3,283.95
Light, heat and water	20	4,037.00
Services, guard, janitor	3	9,778.43
Equipment	10	2,610.56
Laboratory after Jan. 1, 1918	10a	10,357.62
Office " " " "	10b	3,170.55
Supplies		
Laboratory	4	5,369.63
Office	9	1,619.80
Construction & Repair	11	17,834.96
Printing & mimeographing	6	6,524.58
Medical service	8	6,686.73
Athletic equipment	22	1,735.04
Athletic expense	23	5,237.28
Rent	21	2,037.40
Incidentals	7	7,152.32
Building #1	5	5,308.56
Building #2	12	7,008.55
Building #3	17	4,062.60
Building #4	18	3,764.75
Building #5	28	1,841.47
Barracks "C"	13	17,146.03
Barracks "D"	15	4,602.16
Barracks "E"	14	4,527.04
Barracks "F"	16	4,512.04
Barracks "G"	19	4,453.79
Barracks "H"	25	4,496.14
Barracks "I"	26	3,924.67
Penguin Shed	30	3,328.23
		$284,359.16
Cost of buildings not yet chargeable		7,141.96
		$291,501.12

Expenditures

May 21, 1917 to December 31, 1918.

Staff of instruction	1	$ 114,949.86
Office staff	2	9,618.64
Commandant, President, to June 30, 1918	2a, 2b	[illegible]
Light, heat and water	20	[illegible]
[illegible]	3	[illegible]
Equipment	10	[illegible]
Laboratory after Jan. 1, 1918	10a	[illegible]
Office " " " "	10b	[illegible]
Supplies		
Laboratory	4	[illegible]
Office	9	[illegible]
Construction & Repair	11	[illegible]
Printing & mimeographing	6	6,524.88
Medical service	8	[illegible]
Athletic equipment	22	[illegible]
Athletic expense	23	[illegible]
Rent	21	[illegible]
[illegible]	7	[illegible]
Building #1	5	[illegible]
Building #2	12	[illegible]
Building #3	17	4,083.60
Building #4	18	[illegible]
Building #6	28	1,841.47
Barracks "C"	13	17,146.05
Barracks "D"	15	4,806.15
Barracks "E"	14	[illegible]
Barracks "F"	16	[illegible]
Barracks "G"	19	[illegible]
Barracks "H"	25	4,496.14
Barracks "I"	26	[illegible]
Penguin Shed	30	[illegible]
		$284,389.16
Cost of buildings not yet chargeable		7,141.96
		$291,501.12

STATEMENT OF RECEIPTS AND EXPENDITURES
for the month of December, 1918.
(Estimated)

RECEIPTS

Period ending Dec. 7	$1,066.44
" " " 14	722.83
" " " 21	557.14
" " " 28	-
" " " 31	-
	4,346.41
Charges for lost and damaged property	54.31
Mess allowance for cadets confined in the infirmary	91.20
	4,491.92
Debit balance	5,680.82
	10,172.74

EXPENDITURES

Staff of instruction	1	3,348.00
Staff of Administration	2	955.33
Light, heat and water	20	353.75
Services, guard, janitor	3	168.67
Equipment		
Laboratory	10a	24.77
Office	10b	-
Supplies		
Laboratory	4	92.15
Office	9	11.20
Construction & Repair	11	-
Printing & mimeographing	6	33.50
Medical service	8	144.00
Athletic equipment	22	-
Athletic expense	23	276.31
Rent	21	100.00
Incidentals	7	324.49
Building #3	17	451.40
Building #4	18	418.30
Building #5	28	613.81
Barracks F	16	451.25
Barracks H	25	642.30
Barracks I	26	654.11
Penguin Shed	30	1,109.40
		$10,172.74

STATEMENT OF RECEIPTS AND EXPENDITURES
For the month of December, 1928.
(Continued)

RECEIPTS

Period ending Dec. 7	[illegible]
" " " 14	[illegible]
" " " 21	[illegible]
" " " 28	[illegible]
" " " 31	[illegible]
	[illegible]
Charges for loss and damage property	[illegible]
Mess allowance for cadets confined in the infirmary	[illegible]
	[illegible]
Debit balance	[illegible]
	[illegible]

EXPENDITURES

Staff of instruction	1	[illegible]
Staff of administration	2	[illegible]
Light, heat and water	20	589.75
Services, guard, janitor	3	[illegible]
Equipment		
Laboratory	10a	[illegible]
Office	10b	-
Supplies		
Laboratory	4	[illegible]
Office	6	[illegible]
Construction & Repair	11	-
Printing & stenography	6	[illegible]
General service	8	[illegible]
Athletic equipment	22	-
Athletic expense	23	[illegible]
Rent	21	[illegible]
Incidentals	7	[illegible]
Building #3	17	[illegible]
Building #4	18	[illegible]
Building #5	19	[illegible]
Barracks F	14	[illegible]
Barracks E	13	[illegible]
Barracks I	24	[illegible]
Fragrie Ford	30	[illegible]

EXPENDITURE BY DEPARTMENTS

for the month of December, 1918.

	Salaries	C.& R.	Printing	Equipment	Supplies	Incid.	Total
Administration	1,444.54	-	33.50	-	7.25	-	1,485.29
Military Subjects	126.50	-	-	-	-	-	126.50
Engines	833.48	-	-	-	-	-	833.48
Airplanes	614.15	-	-	-	-	-	614.15
Gunnery	688.67	-	-	-	-	-	688.67
Signalling	265.83	-	-	-	-	-	265.83
Observation	282.16	-	-	8.57	-	26.12	316.85
Org. Sports	66.67	-	-	-	-	276.31	342.98
Drill Discp.	-	-	-	-	-	-	-
Barracks	-	-	-	-	38.00	-	38.00
General	150.00	-	-	16.20	58.10	298.37	522.67
Medical						144.00	144.00
Rent						100.00	100.00
Light, Water Fuel						353.75	353.75
	4,472.00	-	33.50	24.77	103.35	1198.55	5832.17

Monthly charge for barracks and laboratories 4340.57

Total expenditures $10,172.74

Budget for January 1919

RECEIPTS

Week ending Jan. 4	$ 127.98
" " " 11	430.72
" " " 18	360.00
" " " 25	200.00
Period " " 31	170.00
	$ 1288.70
	5403.11
	$ 6691.81

EXPENDITURES

Staff of instruction	1	2203.42
Office staff	2	604.07
Commandant) to June 30, '18	2a	
President)	2b	
Light, Heat and water	20	211.00
Services, guard, janitor	3	266.00
Equipment	10	
Laboratory	10a	
Office	10b	
Supplies		
Laboratory	4	25.00
Office	9	25.00
Construction & Repair	11	200.00
Printing & Mimeographing	6	30.00
Medical service	8	50.00
Athletic equipment	22	
Athletic expense	23	100.00
Rent	21	100.00
Incidentals	7	500.00
Building #5		613.81
Barracks I		654.11
Penguin Shed		1109.40
		$ 6691.81

Receipts

The income of the school was the compensation paid by the U. S. Army for instruction of officer candidates according to the terms of a contract. This contract provided for the payment of "ten dollars per week for each of the first four weeks' instruction and five dollars for each succeeding week, provided in that the total compensation for each student shall in no case exceed sixty-five dollars." This was effective until July 1, 1918. At that time another contract, eliminating the sixty-five dollar limit, was signed.

Another source of income was through the rental of "C" Barracks and some laboratory equipment to the Vocational and Radio Schools.

Expenditures

Expenditures were kept track of by the Committee under the following heads:

Account #1 - Staff of Instruction.
This includes salaries paid to academic and military instructors of the school.

Account #2 - Staff of Administration.
This account includes salaries paid to the President, Vice President, and Advisory Member of the Academic Board, accountant, clerical assistants in the Commandant's office, clerical assistants in the President's office, with any additional administrative assistants furnished by the University, Toolroom keeper and assistant, stenographer for the faculty, director of the band.

Account #3 - Service.
Includes watchman and janitor service and janitor supplies for the various barracks and lavoratories of the school.

Account #4 - Laboratory Supplies.
Includes such items as dry batteries, oil, wire, solder, screws, acid, chalk, linen, etc.

Account #6 - Printing and Mimeographing.
This account includes all printing, mimeographing and stationery.

Account #7 - Incidentals.
This account includes freight, telegrams, drayage, telephone calls, travelling expenses, and insurance.

Account #8 - Medical Service
This account covers Informary privileges for officers stationed at the school, enlisted men belonging to both the 818th Aero. Squadron and the Medical Detachment, and all cadets, at a cost of seventy-five cents per man per month.

Receipts

The income of the school was the compensation paid by the U. S. Army for instruction of officer candidates according to the terms of a contract. This contract provided for the payment of "two dollars per week for each of the first five weeks' instruction and fifty cents for each succeeding week, provided in that the total compensation for each student shall in no case exceed sixty-five dollars." This was effective until July 1, 1918. At that time another contract, eliminating the sixty-five dollar limit, was signed.

Another source of income was through the rental of "U" barracks and some laboratory equipment to the Vocational and Radio schools.

Expenditures

Expenditures were kept track of by the Committee under the following headings:

Account #1 - Staff of Instruction.
This includes salaries paid to academic and military instructors of the school.

Account #2 - Staff of Administration.
This account includes salaries paid to the President, Vice President, and Adjutant Member of the Academic Staff, Accountant, clerical assistants in the Commandant's office, clerical assistants in the President's office, with any additional assistantship assistants furnished by the University, Training Roster and assistant, stenographer for the faculty, director of the band.

Account #3 - Service.
Includes workmen and janitor service and janitor supplies for the various barracks and laboratories of the school.

Account #4 - Laboratory Supplies.
Includes such items as dry batteries, oil, wire, solder, screws, acid, chalk, linen, etc.

Account #5 - Printing and Stenographing.
This account includes all printing, stenographing and stationery.

Account #7 - Incidentals.
This account includes freight, telegrams, express, telephone calls, travelling expenses, and insurance.

Account #8 - Medical Service
This account covers Infirmary privileges for officers stationed at the school, enlisted men belonging to both the Sixth Area, Quarters and the Medical Detachment, and all cadets, at a cost of seventy-five cents per man per month.

Account #9 - Office Supplies
This includes folders, stamps, notebooks, rubber stamps, pens, rubber bands, carbon paper, ink, glue, pencils, etc.

Account #10a- Laboratory Equipment
This includes tools and equipment necessary for carrying on instruction in laboratories, such as telegraph keys, reflectoscope, books, step ladders, etc.

Account #10b- Office Equipment
This account includes furniture, such as desks, tables, chairs, also typewriters, filing cabinets, etc.

Account #11 - Construction and Repair
This includes work done and material furnished by the department of Grounds & Buildings at the University for alterations and additions and repairs to the various buildings belonging to the school.

Account #20 - Light, Heat and Water.
This account includes gas, electricity and water used in all the buildings belonging to the school.

Account #21 - Rent
At the present time this account includes the rent of the Rising House and part of the basement of Stiles Hall.

Account #22 - Athletic Equipment
This includes items such as tennis shoes, boxing gloves, soccer balls, indoor baseballs and bats, and medicine balls.

Account #23 - Athletic Running Expense
This includes administration, collection and distribution of towels, storeroom assistants, laundry of suits and towels, soap and water, heating of water, interest on the original investment of the Physical Education Department and depreciation of clothing and towels, the life of which is considered as eighteen months.

Accounts #5, #12, #17, #18, #28 - Buildings and Equipment
This account includes expenditures for laboratory buildings which is to be charged off in monthly payments.

Accounts #13, #14, #15, #16, #19, #25, #26, #30 - Barracks and Equipment.
This account includes expenditures for housing facilities for cadets and is to be charged off in monthly payments, the same as Buildings and Equipment.

The cost of laboratory buildings and barracks was charged off over a period of months ranging from six to twelve. The following table shows the date of construction, the cost and the period and amount of amortization for the various buildings making up the Aeronautics group.

Account #8 - Office Supplies

This includes stationery, stamps, typewriter, ink, or sharpe, pens, rubber bands, cards, paper, ink, glue, pencils, etc.

Account #20- Laboratory Equipment

This includes tools and equipment necessary for carrying on instruction in the laboratory, such as analytical balances, calculators, burets, step ladders, etc.

Account #30- Office Equipment

This account includes furniture, such as desks, tables, chairs, also typewriters, filing cabinets, etc.

Account #31 - Construction and Repair

This includes work done and material furnished by the department of Grounds & Buildings at the University for alterations and additions and repairs to the various buildings belonging to the school.

Account #50 - Light, Heat and Water.

This account includes gas, electricity and water used in all the buildings belonging to the school.

Account #51 - Rent

At the present time this account includes the rent of the dining room and part of the basement of Collins Hall.

Account #60 - Athletic Equipment

This includes items such as tennis shoes, boxing gloves, tennis balls, indoor baseballs and bats, and volleyball balls.

Account #61 - Athletic Running Expense

This includes administration, collection and distribution of funds, employing officials, laundry of suits and towels, soap and care, heating of water, interest on the original investment of the Physical Education department and depreciation of clothing and towels, the life of which is considered as eighteen months.

Accounts #, #32, #37, #38, #39 - Building and Equipment

This account includes expenditures for important building work to be charged off in monthly payments.

Accounts #33, #34, #35, #36, #40, #45, #50, #70 - Services and Expenses.

This account includes expenditures for heating facilities for radio and is to be charged off in monthly payments, the same as Buildings and Improvements.

The work of laboratory furniture and furnaces was carried out from a period of months requiring from six to twelve. The following table lists the date of construction, the cost, and the yearly and monthly of depreciation for the various buildings making up the Aeronautics group.

Schedule showing Amounts charged off each month for Barracks and Laboratories

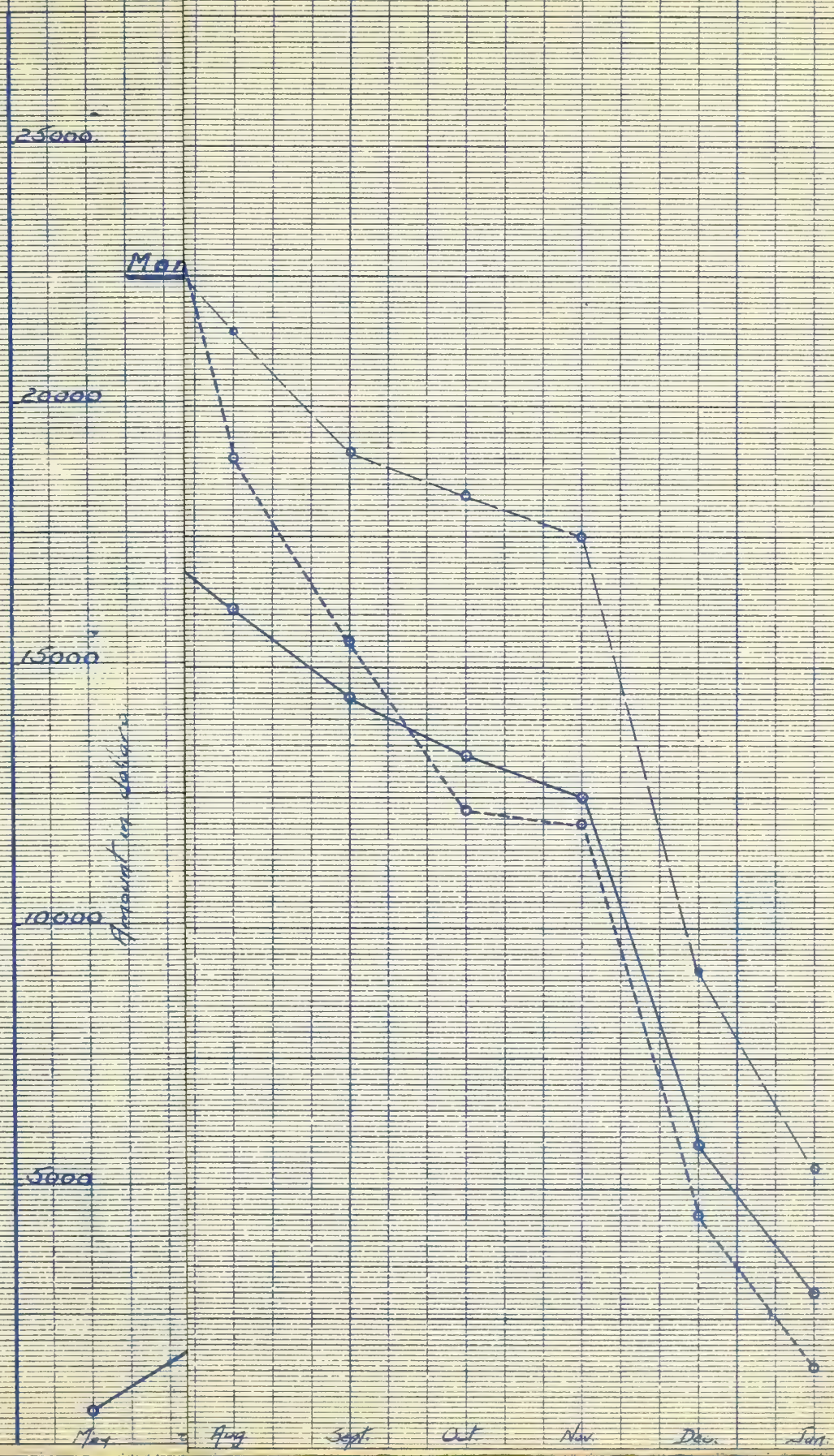
	Built	To be charged off	Cost	Monthly Charge
#5 Building #1	June '17	July '18	5308.56	442.38
12 " #2	Oct. '17	July '18	7008.55	778.72
17 Airplanes #3	April'18	Jan. '19	4062.60	451.40
18 Engines #4	April'18	Jan. '19	3764.75	418.30
28 Map #5	Oct. '18	June '19	4910.52	613.81
13 Barracks C	Oct. '17	Oct. '18	17146.03	1,428.83
14 " D	Feb. '18	Sept.'18	4602.16	657.45
15 " E	Jan. '18	Aug. '18	4527.04	646.72
16 " F	Mar. '18	Jan. '19	4512.53	451.25
19 " G	May '18	Dec. '18	4453.79	636.25
25 " H	June '18	Jan. '19	4496.14	642.30
26 " I	July '18	Feb. '19	4578.78	654.11
30 Penguin Shed	Oct. '18	Mar. '19	5547.03	1109.40

Cost of Lavatory units distributed among barracks as fairly as possible, there being one unit to each group of three barracks.

Schedule showing amounts charged to each month for patients and laboratories

	Date	In be charged off	Cost	Monthly Charge
9 Building 2	June '17	July '18	6308.55	452.37
13 " 4	Oct. '17	July '18	7008.55	779.72
17 Airplane 6	Apr. '16	Jan. '19	4062.60	481.40
18 Trucks 4	April '18	Dec. '19	3764.75	418.30
22 Lab 2	Oct. '18	June '19	4210.52	513.21
12 Machine 6	Oct. '17	Jan. '19	17146.05	1,456.23
14 " 5	Nov. '18	Sept. '19	4002.14	357.42
16 " 8	Jan. '18	Dec. '19	4857.04	324.72
15 " 7	Dec. '18	Jan. '19	4812.01	481.36
18 " 6	Sept '18	Dec. '19	4427.71	332.32
23 " 6	June '19	Jan. '19	4486.14	642.30
24 " 1	July '18	Feb. '19	4578.72	324.11
29 Furnace Station	Oct. '18	Mar. '19	3847.02	1102.40

Cost of factory units distributed among products on fairly as possible. Have listing one unit to each group of these products.


25000.
20000
15000
10000
5000
Amount in dollars
Mar.
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.

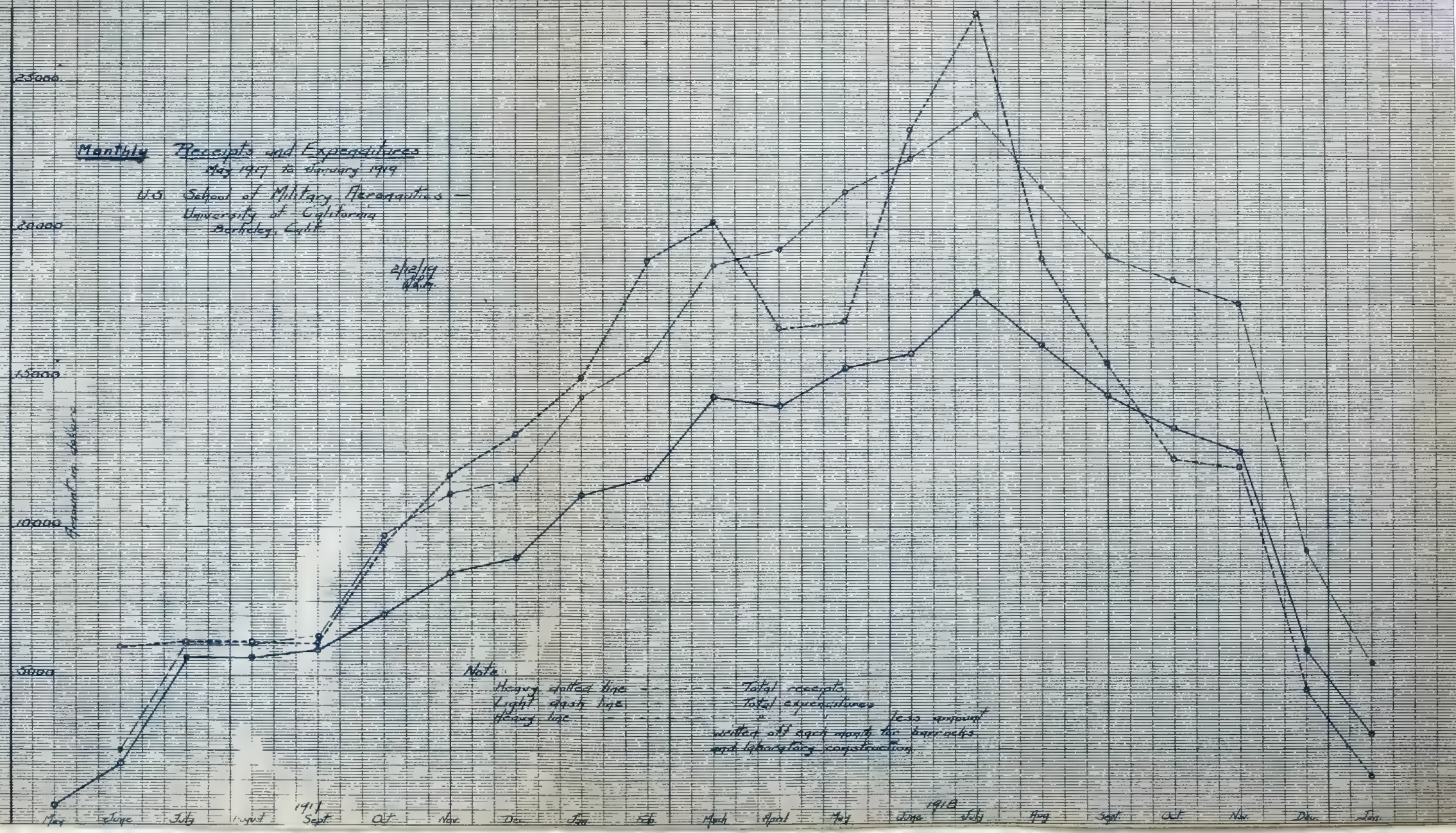

Monthly Receipts and Expenditures
May 1917 to January 1919
U.S. School of Military Aeronautics —
University of California
Berkeley, Calif.
25000
20000
15000
10000
5000
Amounts in dollars
Note
Heavy dotted line - - - - Total receipts
Light dash line — — — Total expenditures
Heavy line — — — " " less amount
written off each month for barracks
and laboratory construction
May
June
July
August
1917
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
March
April
May
June
1918
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.

Table No. 18

FINANCIAL STATEMENT

This statement shows receipts and expenditures from May 21, 1917 to January 31, 1919, estimated where necessary.

RECEIPTS

Period from May 21 to Dec 31, 1918	$253,486.00
Period ending January 4, 1919	127.98
Week " " 11,	430.72
" " " 18,	360.00
" " " 25,	299.28
Period " " 31	200.00
	254,903.98
Charges for lost and damaged property	706.24
Mess allowance for cadets confined in infirmary	3,542.00
Rent "C" Barracks	2,027.83
Misc. Receipts	263.94
	261,443.99
Debit Balance	34,790.87
	296,234.86

Period from May 21 to Dec 31, 1918

EXPENDITURES

May 21, 1917 to January 31, 1919.

Staff of instruction	1	117,336.58
Staff of Administration	2	10,222.71
Office Staff		
Commandant)	2a	3,378.32
President)	2b	3,283.95
Light, heat and water	20	4,352.79
Services, guard, janitor	3	11,126.43
Equipment	10	2,610.56
Laboratory after Jan. 1, 1918	10a	10,400.39
Office " " 1, 1918	10b	2,970.55
Supplies		
Laboratory	4	5,403.32
Office	9	1,670.74
Construction & Repair	11	18,251.16
Printing & mimeographing	6	6,648.58
Medical service	8	6,769.23
Athletic equipment	22	1,735.04
Athletic expense	23	5,133.59
Rent	21	2,137.40
Incidentals	7	7,885.05
Building #1	5	5,308.56
Building #2	12	7,008.55
Building #3	17	4,062.60
Building #4	18	3,764.75
Building #5	28	2,455.28
Barracks "C"	13	17,146.03
Barracks "D"	15	4,602.16
Barracks "E"	14	4,527.04
Barracks "F"	16	4,512.53
Barracks "G"	19	4,453.79
Barracks "H"	25	4,496.14
Barracks "I"	26	4,578.78
Penguin Shed	30	4,437.63
		292,670.22
Cost of buildings not yet chargeable		3,564.64
		296,234.86

O. UNIVERSITY POLICY.

1. The one definite policy the University of California had had in operating the School of Military Aeronautics for the Government has been to provide the best instruction possible to the candidates sent here by the War Department, this instruction to be given in accordance with the wishes of the War Department. The University has made no profit on the operation of the School, nor has it wished to make any and has always readily advanced the funds necessary for the proper conduct of the School. The closest co-operation has always existed between the University Officials and the Commandant of the School.

2. At the same time the School of Military Aeronautics was being conducted, the University of California was carrying on numerous other war activities, such as the Naval School, Vocational Training School, School for Radio Electricians, and in the later months, the Student Army Training Corps. With so many different branches of war work represented on the campus there have necessarily been from time to time some minor conflicts regarding the use of buildings, equipment, drill fields, etc., particularly since the institution of the Student Army Training Corps, which comprised practically the entire male student body of the University. During the last few months of operation, a special board, known as the Military and Navy Administrative Board was appointed by the President of the University to pass on all matters affecting the military activities conducted by the University, make proper assignments of buildings and equipment and smooth out any minor difficulties which might arise.

6. [illegible] POLICY.

1. The one definite policy the University of California had had in operating the School of Military Aeronautics for the Government has been to provide the best instruction possible to the candidates sent here by the War Department. This instruction to be given in conference with the wishes of the War Department. The University endeavors no profit on the operation of the School, nor has it wished to make any net has always readily advanced the funds necessary for the proper conduct of the School. The closest co-operation has always existed between the University officials and the Commandant of the School.

2. At the same time the School of Military Aeronautics was being conducted, the University of California was carrying on numerous other war activities, such as the Naval School, Educational Training Detail, School for Radio Electricians, and in the later months, the Student Army Training Corps. With so many different branches of war work carried on on the campus there have necessarily been times to time some minor conflicts regarding the use of buildings, equipment, Drill Fields, etc., particularly since the institution of the Student Army Training Corps, which comprised practically the entire male student body of the University. During the last few months of operation, a special board, known as the Military and Naval Administrative Board was appointed by the President of the University to pass on all matters affecting the military activities conducted by the University, make proper assignments of buildings and equipment and smooth out any minor difficulties which might arise.

P -- OFFICERS ON DUTY AT SCHOOL

1. QUARTERS AND MESS.

No provision was ever made at this institution for quarters and mess for Officers. Commutation for quarters, heating and light has always been supplied to Officers by the War Department and suitable quarters have been found in the City of Berkeley wherever desired by the Officers. A number have found it convenient to obtain rooms at the Faculty Club of the University, which was glad to accept any Officer as a transient member in the Club without initiation fee and with a very nominal monthly dues.

2. INSTRUCTOR'S COMMISSIONS.

Shortly after the School opened in May, 1917, commissions in the Aviation Section of the Signal Corps were granted to three Heads of Departments, Lieutenant McPherson, Lieutenant Jones, and Lieutenant Heffner, Heads respectively of the Signalling, Gunnery and Military Subjects Department. Considerable discussion has taken place regarding the desirability and possibility of obtaining commissions for instructors in the School, some opposition toward this procedure being held by the President of the Academic Board, except in the case of instructors in the Military Subjects Department. Because of the fact, however, that practically all of the instructors serving at the School were qualified to hold commissions and were leaving continually for other branches of the service where they could obtain commissions, a limited number were granted to instructors from time to time. In March and April, 1918, four commissions in the Aviation Section of the Signalling Corps were granted to instructors of the School. A little later authority was granted by the War Department for a Corps of Instructors, these men to be commissioned in the Air Service. This School obtained ten of these commissions which were granted to instructors during the months of August and September, 1918. This allotment of commissions quieted somewhat the unrest and desire to leave existing at that time. However, the question was again becoming somewhat acute at the time of the signing of the armistice, and inquiries had been made by the Commandant as to the possibility of obtaining additional commissions.

3. ROSTER OF OFFICERS.

The following is a complete roster of the Officers who have served at this School, giving the duties and period of service here as commissioned Officers. Some of the men in this list who served as instructors were at the School for many months prior to the period of service noted in the tabulation below.

B -- OFFICERS OF THE AIR SCHOOL

1. QUARTERS AND MESS.

No provision was ever made at this institution for quarters and mess for Officers. Commutation for quarters, heating and light has always been applied to officers by the War Department and suitable quarters have been found in the city of Fairbanks whenever desired by the officers. A number have found it convenient to obtain rooms at the Faculty Club of the University, which was glad to accept any officer as a transient member in the Club without initiation fee and with a very nominal monthly dues.

2. INSTRUCTOR'S COMMISSIONS.

Shortly after the School opened in July, 1917, commissions in the Aviation Section of the Signal Corps were granted to three Heads of Departments, Lieutenant Heffernan, Lieutenant Jones, and Lieutenant Hartner, Heads respectively of the Engineering, Gunnery and Military Subjects Departments. Considerable discussion has taken place regarding the desirability and possibility of obtaining commissions for instructors in the School, some opposition toward this procedure being held by the President of the Regents Board, except in the case of instructors in the Military Subjects Department. Because of the fact, however, that practically all of the instructors serving at the School were qualified to hold commissions and were serving continually for other branches of the service where they could obtain commissions, a limited number were granted to instructors from time to time. In March and April, 1918, four commissions in the Aviation Section of the Signalling Corps were granted to instructors of the School. A little later authority was granted by the War Department for a Corps of Instructors, these men to be commissioned in the Air Service. This School obtained ten of these commissions which were granted to instructors during the months of August and September, 1918. This allotment of commissions quieted somewhat the unrest and desire to leave existing at that time. However, the question was again becoming acute at the time of the signing of the armistice, and inquiries had been made by the Commandant as to the possibility of obtaining additional commissions.

3. ROSTER OF CANDIDATES.

The following is a complete roster of the officers who have served at this School, giving the nature and period of service here as commissioned officers. Some of the men in this list who served as Instructors were at the School for many months prior to the period of service noted in the tabulation below.

Table No. 19

ROSTER OF OFFICERS

SCHOOL OF MILITARY AERONAUTICS--BERKELEY

Name	Rank	Duties performed Reported (dates Discharged or transferred (dates)
Adams, Benjamin H	Lst Lt., S. R. C.	Reported January 24, 1918 - under instructions - Transferred March 1,1918
Bacon, Leonard	2nd Lt., S. R. C.	Reported for temporary duty Feb. 5,1918 transferred Feb. 13, 1918.
Berglund, Roscoe L	2nd Lt., A. S., A.	Reported Sept. 11, 1918 - Instructor- Discharged January 3, 1919.
Brady, William C.	Captain, A.S., M. A.	Reported Jan. 18, 1918- Pers. Adjutant- on duty 3/1/19
Brown, Laurence C.	Colonel, S. C.	Reported for temporary duty Aug. 5,1918 transferred August 14, 1918.
Campbell, Marston, Jr.	2nd Lt., A. S. A.	Reported March 29, 1918 - Instructor - Transferred October 10, 1918.
Conant, David J.	2nd Lt. A. S., M. A.	Reported June 8/18 - Instructor Discharged 2/11/19.
Crane, Charles B	Major, A. S., A.	Reported Jan 7, 1918 - Commandant on duty 3/1/19
Donnelly, Robert T. M.	Lst Lt., M. C.	Reported Oct., 25, 1918 - on duty with Medical Research Laboratory Transferred Jan.18, 1919.
Dreyer, Walter	1st Lt., A. S., A.	Reported Sept. 6, 1918 - Instructor Discharged January 10, 1919.
Edwards, Jesse C.	1st Lt. M. C.	Reported Jan 28, 1918 Discharged Jan 20. 1919.
Fredell, George B.	1st. Lt., A. S. M. A.	Reported August 31, 1918 - under instruction - transferred Oct. 11, 1918.
Fuller, Willard P.	Capt. S. C.	Reported for temporary duty July 25, 1918, transferred July 27, 1918.

Table No. 12

[illegible]

[illegible]

Name	Rank	Duties performed. Discharged or Reported (dates transferred (dates)
[illegible]	[illegible]	[illegible] - [illegible] [illegible] - transferred [illegible]
[illegible], [illegible]	[illegible]	[illegible] transferred Feb. 13, 1918.
[illegible], [illegible]	[illegible]	[illegible] - [illegible] discharged January [illegible], [illegible].
[illegible], [illegible]	[illegible]	[illegible] - [illegible] adjutant- on duty 5/1/19
Brown, Lawrence [illegible]	[illegible]	[illegible] transferred August 14, 1918.
[illegible], [illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible] - [illegible]
[illegible]	[illegible]	[illegible] on duty 5/1/19
[illegible], Robert T. [illegible]	1st Lt., M. C.	Reported Oct., 26, 1918 - [illegible]
[illegible], Walter	1st Lt., A. S. A.	[illegible] Discharged [illegible], [illegible].
[illegible], [illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible] ported August 31, 1918 - under instruction - transferred Oct. 11, 1918.
[illegible], [illegible]	[illegible]	Reported for temporary [illegible] 1918, transferred [illegible]

Gough, Albert S.	Lst. Lt., M. C.	Reported Jan. 26, 1918 Transferred Jan. 30, 1919.
Grey, George V.	Lst Lt., A. S., M. A.	Reported Sept. 11, 1918 - Instructor Discharged January 28, 1919.
Heffner, Roy J.	Lst. Lt., A. S.,M.A.	Reported Sept. 28, 1917 - Instructor Transferred June 13, 1918.
Hunter, George B.	Lt. Col., S. C.	Reported Oct. 8, 1917 - Commandant- Transferred Nov. 13, 1918.
Iglehart, Francis N.	Capt. S. C.	Reported Sept. 4, 1917 - Adjutant Transferred Feb. 14, 1918.
Johnson, Harry M.	Captain, Sanitary C.	Reported October 28, 1918 - on duty with Medical Research Laboratory Transferred Jan. 8, 1919.
Johnson, Reuben A.	Lst. Lt. M. C.	Reported Oct. 23, 1918 - on duty with M.R.L. Transferred Jan. 18, 1919.
Jones, Lloyd T.	1st Lt., A. S., A.	Reported Sept. 28, 1917 - Instructor Transferred April 16, 1918
Jones, William M.	2nd Lt. A. S. M.A.	Reported June 3, 1918 - Instructor Discharged Feb. 10, 1919.
Kleyla, John R.	1st Lt., M. C.	Reported Oct. 25, 1918 - on duty with M.R.L. transferred Jan, 18, 1919.
Krogstad, Arnold N.	Major S. C.	Reported May 20, 1917 - Commandant Transferred Oct. 2, 1917.
Leffler, Claude W. S.	2nd Lt., A.S. A.	Reported May 10, 1918 - temporary duty research work - transferred Nov.27,' 1918.
Legge, Robert, T.	Captain M. C.	Reported July 14, 1918 Discharged Jan, 2, 1919.
Mary, Jacob	2nd Lt. A.S., M. A.	Reported Dec. 17, 1917 - Quartermaster on duty 3/1/19
Mathews, Neil D.	1st Lt. A. S. A.	Reported Jan. 2, 1918 - Instructor Discharged Jan, 8, 1919.
McLean, Howard L.	2nd Lt., A. S., A.	Reported April 11, 1918 - Instructor Discharged Jan. 14, 1919.

Name	Rank	Duties performed Reported (dates) Discharge or transferred (dates)
McPherson ,Robert B.	1st. Lt. A. S., M. A.	Reported Sept. 24, 1917 - Instructor Discharged Jan. 28, 1918.
Murphy, George T.	2nd Lt., A.S. M. A.	Reported Oct. 22, 1918 - Instructor Discharged Dec. 31, 1918.
Nichols, Frank H.	Captain, M. C.	Reported Apr 10, 1918 - Pres. of Med. Ex. Board - Transferred May 30, 1918.
Otrich, Grover C.	1st Lt. M. R.	Reported Aug. 30 1917 - Transferred September 18, 1917
Perkins, Erwin F.	2nd Lt., A. S., A.	Reported August 12, 1918 - Instructor Discharged Dec. 31, 1918.
Pillsbury, Edwin D.	1st. Lt., A. S., S. C.	Reported Oct. 13, 1917 - Instructor transferred March 23, 1918
Price, George E.	1st. Lt. U.S.A. Retired	Reported Sept. 28, 1918 - Instructor Relieved November 30, 1918.
Reed, Harold B.	Lst. Lt., A. S., M. A.	Reported Oct., 18, 1917 - Instructor transferred Sept 13, 1918.
Rhoades, Roy S.	2nd Lt. A. S., A.	Reported Sept. 9, 1918 - Instructor Discharged Dec. 26, 1918.
Rogers, Guy W.	2nd Lt., A. S., M. A.	Reported June 3, 1918 - Instructor Discharged Jan. 11, 1919.
Sandow, Bruno F.	Captain, M. C..	Reported July 31, 1917 Transferred 2/21/19
Smith, Allyn G.	2nd Lt. A. S., A.	Reported June 8, 1918 - Instructor Transferred October 2, 1918.
Steen, Edwyn F.	2nd Lt., A. S., A.	Reported Sept. 2, 1918 - Instructor Discharged January 4, 1919.
Stoodley, Gerald, F.	Captain, Dental Corps	Reported July 30, 1917 Discharged 1/28/19
Thomas, Gilbert M.	1st Lt., A. S., A.	Reported Sept 11, 1918 - Instructor Discharged January 7, 1919.
Waite, Raymond A.	1st Lt., A. S., A.	Reported Aug. 28, 1918 - Instructor Discharged January 8, 1919.

[illegible], George L.	1st Lt., [illegible]	[illegible]
[illegible], George L.	2nd Lt., [illegible]	[illegible]
[illegible], Frank H.	Captain, M. C.	Reported Aug[illegible] [illegible]. Board -
[illegible], Henry C.	[illegible]	[illegible]
[illegible], Henry C.	2nd Lt., A. S., A.	Reported August [illegible] [illegible]
[illegible], [illegible]	[illegible]	[illegible]
[illegible]	1st. Lt. U.S.A. Retired	Reported Nov[illegible] Relieved November 30, [illegible]
Reed, Harold G.	1st. Lt., A. S., A.	Reported Oct., 19[illegible] - [illegible] transferred Sept 19[illegible]
[illegible], Roy S.	2nd Lt. A. S., A.	Reported Sept. [illegible] - [illegible] Discharged Dec. 26, [illegible]
[illegible], Guy W.	2nd Lt., A. S., M. A.	Reported June 3, 19[illegible] - Discharged Jan. 11, [illegible]
[illegible], Jesse E.	Captain, M. C.	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

Name	Rank	Duties performed Discharge or Reported (dates transferred (dates)
White, Leonard M.	2nd Lt., A. S., A.	Reported Sept. 4, 1918 - Instructor Discharged January 8, 1919.
Wilkinson, Arthur H.	2nd Lt., A. S., M. A.	Reported Aug. 5, 1918 - Instructor Discharged January 6, 1919.
Williams, Milton R.	1st Lt., S. C. A. C.	Sept. 11, 1917 - Supply Officer Transferred December 27, 1917.
Wilson France Q.	Captain A. S. A.	On Temporary duty from Oct. 23, to November 2, 1918.
Winters, Verne W.	2nd Lt., A. S., A.	Reparted August 21, 1918 - Instructor - Discharged Dec. 19, 1918.
Woodruff, Ennis C.	1st Lt. A. S., A.	Reported Aug. 20, 1918 - Instructor Discharged Jan. 6, 1919.

Q -- ENLISTED MEN ON DUTY AT SCHOOL

1. QUARTERS AND MESS.

The War Department did not provide at this School any quarters or mess for enlisted men stationed here. Commutation for quarters has been allowed by the War Department at the prescribed rates then in force. Some of the enlisted men were married, particularly the instructors, these men living at their own homes in Berkeley. Others found it convenient to live in one section of the barracks provided for cadets. This was done, however, by a very small number of the enlisted men, whose duties required that they be constantly near Headquarters of the School.

2. ROSTER OF ENLISTED MEN.

In the early months of operation the enlisted men on duty at the School were assigned here on detached service. The duties of these men were the same as around any post or garrison, such as clerks, assistants in the Quartermaster's storeroom, buglers, and the detachment also included several men of the Medical Corps. The 818th Depot Squadron was later organized and all enlisted men assigned to this squadron. The following is a complete roster of the enlisted men who served at this School giving the duties and period of service. A number of these men who are listed as instructors were on duty at the School as civilians for quite a long time prior to entering the service.

Table No. 20

Enlisted men other than Cadets. Air Service, Military Aeronautics 818th Depot Squadron

Name	Rank	Duties	from	to
Anderson, Peter A	Pvt	Instructor	Mar 23/18	Aug 8/18
Atcheson, George	Pvt	Instructor	July 27/18	Jan 10/19
Bacon, John B.F.	Cpl.	Instructor	Apr 11/18	Feb. 5/19
Baker, Aquila W.	Cpl.	Instructor	June 13/18	Feb 4/19
Baldwin, John L	Sgt. 1st Cl.	Detachment	July 27/17	Feb 4/19
Bank, Charles A	Pvt	Detachment	Nov 5/18	Jan 6/19
Boyd, Robert W.	Sgt.	Detachment	Jan 19/18	Oct 19/18
Carr, Robert G	Sgt. 1st cl.	Instructor	Mar 2/18	Jan 6/19
Cohen, Douglas B	Cpl	Instructor	Apr 8/18	Aug 24/18
Cole, Darrel V.	Cpl	Instructor	Jan 12/18	Feb 5/19
Conn, Russell H.	Sgt. 1st cl.	Detachment	Feb 9/18	Feb 4/19
Ellis John W.	Pvt 1st cl.	Instructor	May 25/18	Feb 4/19
Fageol, Claude H.	Pvt 1st cl	Instructor	May 10/18	Nov 5/18
Falk, Herbert I.	Pvt 1st cl.	Detachment	Dec 22/17	Feb 4/19
Fore, Harry A.	Cpl	Instructor	May 16/18	Feb. 4/19
Fraser, Leslie H.	Sgt.	Detachment	Mar. 16/18	on duty
Frazier, Delmar J.	Corpl	Instructor	Aug 27/17	Aug 24/18
Gerlach, Leonard J.	Pvt 1st cl.	Detachment	June 15/18	Feb 5/19
Graves, Taylor E.	Corpl.	Detachment	Jan 16/18	Jan 10/19

Table No. 20

Air Service, Military Aeronautics
Ellis Depot [illegible]

Name	Rank	Duties	From	to
[illegible], Peter [illegible]	Pvt	Instructor	Mar 25\18	Aug 8\18
[illegible], George	Pvt	Instructor	July 27\18	Jan 10\19
[illegible], John S.T.	Sgt.	Instructor	[illegible]	Feb. 5\19
[illegible], Aquila W.	Sgt.	Instructor	[illegible]	Feb 4\19
Baldwin, John I	Sgt. 1st Cl.	Detachment	July 27\17	Feb [illegible]
Bank, Charles A	Pvt	Detachment	[illegible]	Jan [illegible]
Boyd, Robert W.	Sgt.	Detachment	Jan 19\18	[illegible]
[illegible], [illegible]	Sgt. 1st Cl.	Instructor	Mar 2\18	Jan [illegible]
[illegible], [illegible]	Cpl	Instructor	[illegible]	[illegible]
[illegible], Darrel T.	Cpl	Instructor	Jan 12\18	Feb [illegible]
Cohn, Ernest T.	Sgt. 1st Cl.	Detachment	[illegible]	Feb [illegible]
[illegible]	Pvt 1st Cl.	Instructor	May 25\18	[illegible]
[illegible], Clarence T.	Pvt 1st Cl	Instructor	May 10\18	Nov [illegible]
[illegible], Herbert I.	Pvt 1st Cl.	Detachment	Dec 22\17	Feb 4\19
[illegible], Harry A.	Cpl	Instructor	May 15\18	[illegible]
[illegible], [illegible]	Sgt.	Detachment	[illegible]	on duty
[illegible], [illegible]	Corpl	Instructor	[illegible]	Aug 24\18
[illegible], Leonard C.	Pvt 1st Cl.	Detachment	June 15\18	Feb 5\19
[illegible]	Corpl.	Detachment	[illegible]	Jan 10\19

Gross, Wilfred E.	Pvt 1st Cl.	Instructor	Sept. 30/18	Jan 17/19
Haralson, Dean K	Corporal	Detachment	Nov 8/18	Jan 9/19
Hoffman, George J.	Sergt.	Instructor	Mar 22/18	Feb 5/19
Irwin, George H.	Cpl	Detachment	May 4/18	on duty
Keinath, Joseph	Cpl	Detachment	Mar 30/18	on duty
Levandowski, Charles D	Sgt 1st cl	Detachment	Jan 12/18	Jan 10/19
Lindblad, Theodore D	Corpl	Detachment	Nov 3/17	Nov 5/18
Maher, James D.	Cpl	Instructor	July 26/18	Feb 11/19
Mittenberg, Fred	M. S. E.	Instructor	Dec 12/17	present
Nelson, William H.	Cpl	Instructor	May 1/18	Feb 4/19
Perkins, Erwin F.	Sgt	Instructor	May 11/17	Aug 21/18
Phillips, Oscar W.	Sgt	Instructor	Apr 8/18	Feb 5/19
Prince Eugene M	Sgt	Instructor	July 31/18	Feb 4 /19
Stafford, James N	Sgt. 1st cl.	Instructor	Mar 22/18	Aug 24/18
Teachworth, James F	Pvt 1st cl	Instructor	Aug 24/18	Feb 11/19
Tyler, Walter S.	Pvt	Detachment	Nov 5/18	Jan 4/19
Warth, Edward C	Corpl	Instructor	May 29/18	Dec 31/18
Weppner, Frederick B	Corpl	Detachment	July 6/18	Jan 18/19
White, Leonard M	Sgt 1st cl	Instructor	Feb 25/18	Sept 5/18
Woodruff, Ennis C	Sgt	Instructor	Dec 3/17	Aug 20/18

Medical Department

Avery, Ted L.	Pvt 1st cl	April 4/18	July 13/18
Brown, Wyatt R	Pvt	June 10/18	Sep 12/18
Burlingame, Robert M	Sgt	Nov 11/18	Jan 17/19
Clarke, Elton R	Pvt 1st cl	Nov 19/18	Jan 22/19
Edwards, J. Graham	Pvt 1st cl	Nov 11/18	Jan 17/19
Freeborg, Henry E	Sgt 1st cl	Sep 4/17	Sep 18/18
Halley, James L.	Corpl	Nov. 12/17	Mar 5/18
Holman, Harold G	Private	Nov 19/18	Jan 17/19
Holman, Harold R	Private	Dec 28/17	July 31/18
Holmes, William R.	Corpl	June 27/18	Jan 13/19
Lichty, Rolfe E	Pvt	June 25/18	Feb 3/19
Russell, Les	Pvt 1st cl	Mar 13/18	Jan 18/19
Schwartz, Henry	Pvt 1st cl.	July 11, 1918	Jan 29/19
Stoll, John A.	Pvt.	Nov 11/18	Jan 17/19
Verner, Ogden E	Sgt.	Nov 11/18	Jan 17/19
Williams, Hugh J	Sgt.	April 4/18	Aug 24/18

Medical Department

[illegible], Pierce E.	Pvt 1st cl.	Instructor	Sept. 30\18
[illegible], Jesse E.	Corporal	Detachment	[illegible]
[illegible], George L.	Sergt.	Instructor	[illegible]
[illegible], Ralph A.	Sgt	Instructor	[illegible]
[illegible], Joseph	Sgt	Instructor	Nov 30\18
[illegible], Charles	Sgt 1st cl	Instructor	Jan [illegible]\19
[illegible], Clarence	Sergt.	Detachment	Nov 3\17
[illegible], James	Cpl	Instructor	Apr 25\18
[illegible], Fred	L. C. C.	Instructor	Dec 12\17
[illegible], William	Sgt	Instructor	May 1\18
[illegible], Jesse A.	Sgt	Instructor	May 11\17
[illegible], Ernest	Sgt	Instructor	Apr 8\18
[illegible], Jesse	Sgt	Instructor	[illegible]
[illegible], James	Sgt. 1st cl.	Instructor	[illegible]
[illegible], Ernest	Pvt 1st cl	Instructor	[illegible]
[illegible], Walter	Pvt	Instructor	May 29\18
[illegible], Jesse	Corpl	Detachment	July 6\18
[illegible], Frederick	Sergt	Instructor	[illegible]
[illegible], Samuel	Sgt 1st cl	Instructor	[illegible]
[illegible], Louis C	Sgt	Instructor	[illegible]

Medical Department

[illegible], Jay C.	Pvt 1st cl	[illegible]	[illegible]
[illegible], Hiett	Pvt	[illegible]	[illegible]
[illegible], Arthur	Sgt	[illegible]	[illegible]
[illegible], Glenn	Pvt 1st cl	[illegible]	[illegible]
[illegible], C. Tucker	Pvt 1st cl	[illegible]	[illegible]
[illegible], Jesse	Sgt 1st cl	[illegible]	[illegible]
[illegible], James E.	Corpl	[illegible]	[illegible]
[illegible], Harold	Private	[illegible]	[illegible]
[illegible], Harold	Private	[illegible]	[illegible]
[illegible], William	Sergt	[illegible]	[illegible]
[illegible], Walter	Pvt	[illegible]	[illegible]
[illegible], Dan	Pvt 1st cl	[illegible]	[illegible]
[illegible], Elmer	Pvt 1st cl.	[illegible]	[illegible]
[illegible], Frank A.	Pvt.	[illegible]	[illegible]
[illegible], Roger	[illegible]	[illegible]	[illegible]
[illegible], Roy	Sgt.	[illegible]	[illegible]

R -- MEDICAL RESEARCH LABORATORY

1. In October, 1918, the Commandant of this School was advised to make arrangements with the University for providing from twenty-five hundred to three thousand square feet of floor space for the establishment of a Medical Research Laboratory, and in addition to provide quarters for an enlisted personnel of twelve men and for a commissioned personnel of about ten officers. The space provided was planned to be sufficient to examine five hundred men each month. The work of these Medical Research Units was to conduct certain physical tests to determine the adaptability of the cadets to continue under instruction in the School of Military Aeronautics.

In compliance with the request of the War Department, approximately two thousand four hundred square feet of floor space was provided by taking for this purpose one half of "E" Barracks, one of the units in the group of campus barracks. Upon the arrival of the officers attached to the Medical Research Unit, this space was subdivided in accordance with their wishes, proper partitions, shelving, plumbing, and tables being installed in addition to the installation of the special equipment required in this work. This installation was nearing completion at the time the armistice was signed. Upon the signing of the armistice, work on this installation was stopped, as well as all other construction then being carried out by the University. Hence no actual results were ever obtained at this School from the Medical Research Unit.

S -- ADJUTANTS' SCHOOL

1. In November, 1917, the Commandant was advised to prepare for the reception of ten officers who were to be trained as Adjutants. This course was to be five weeks in length, and a curriculum covering same was furnished. The plans of the War Department were changed in December, 1917, prior to the arrival of any of the personnel who were to be trained as Adjutants, and in the early part of January, 1918, the Commandant was advised that it had been decided that no Adjutants would be trained at the University of California, this School to continue as a training school for pilots only.

T. INSPECTION OF SCHOOL

1. It is felt that the ground school located at the University of California has been at a slight disadvantage in comparison with some of the other schools in regard to the matter of frequent inspection by officers from the Director of Military Aeronautics. Being so far from Washington it was not convenient for frequent inspection trips to be made from the headquarters in Washington. To counteract this condition in so far as possible, Dr. Woods, President of the Academic Board, made two trips to Washington and while enroute visited some of the other schools. Also the Commandant, Lieutenant Colonel Hunter, made a trip of inspection to the school in Austin during the Christmas vacation 1917-18.

However, the school was gratified with the trips which it was possible for the officials to make from time to time. Major Bingham and Lieutenant Colonel Ries visited the school in the latter part of June, 1917. Major Moulthrop has made three or four tours of inspection which included this school. Major General Squier made a tour of inspection in October, 1917 and Major General Kenley visited the school in August 1918. Both of these officers expressed themselves as pleased with the work of the school as then being given.

2. INSPECTION OF SCHOOL

1. It is felt that the ground school located at the University of California has been at a slight disadvantage in comparison with some of the other schools in regard to the matter of frequent inspection by officers from the director of military aeronautics. Being so far from headquarters it was not convenient for frequent inspection trips to be made from the headquarters in Washington. In consideration this condition in so far as possible, Mr. Bruce, president of the academic board, made the trips to headquarters and acted as official head of the school schools. Also the commanding, lieutenant colonel Hunter, made a trip of inspection to the school in April during the christmas vacation 1917-18.

However, the school was positive with the trips which it had provided for the officers to come from time to time. Major Hughes and Lieutenant Colonel Pike visited the school in the latter part of June, 1917. Major Hoffhuff has made three or four trips of inspection which includes this school. Major General Taylor made a tour of inspection in October, 1917 and Major General Henry visited the school in August 1918. Both of these officers expressed themselves as pleased with the work of the school as then being done.

U. CLOSING OF SCHOOL

1. PERIOD OF CLOSING:

Upon the signing of the armistice on November 11, 1918, the construction work then in progress was immediately stopped although no word regarding the future operation of the school was received from Washington until approximately one week after that date. Instructions were then received to shorten the length of the course from twelve to ten weeks. This program was carried out with all squadrons except the last squadron, this being put through in nine weeks, graduating on Saturday, February 1st. The school officially closed on that date although the administrative offices were in operation for some weeks subsequent to that time, being still operating on March 1, 1919, at the time this report was concluded.

After receiving notice that the school was to close, the staff was reduced as rapidly as proper maintenance of instruction would permit. By February 1st the entire staff, with the exception of two or three instructors who were assisting in the administration, had been discharged.

2. INVENTORY:

When it was definitely decided that the school was to close, an inventory Board was appointed from the members of the staff, whose duty it was to make a complete inventory of all equipment used by the school whether Government property or belonging to the University. This report was prepared and has been of much assistance to the clerks preparing the final inventory on which bids were obtained by the University in order to dispose of the property used by the school. At the time this report was being concluded bids for the barracks buildings had been received and accepted by the University and these buildings were being removed. Government property was rapidly being shipped away as fast as the Quartermaster could get it packed and obtain shipping orders.

3. FUTURE PLANS PRIOR TO THE SIGNING OF THE ARMISTICE:

Prior to the signing of the armistice, the school had been notified to be prepared to receive squadrons ranging in size from 50 to 100 cadets and inasmuch as the capacity of the school was rated at 1200 it was apparently the plan of the War Department to send squadrons of 100 men through the winter. The school had the nucleus of an exceptionally strong staff, instruction in the various departments was well organized and sufficient equipment on hand to take care of a large school.

[illegible]

[illegible]

Upon the signing of the armistice on November 11, 1918, the construction work then in progress was immediately stopped although no mid-winding the photo operations of the school was received from Washington until approximately one week after that date. Instructions were then received to discontinue the lengths of the course from twelve to ten weeks. This program was carried out with all students except the last graduation, this being put through in nine weeks, graduating on schedule, January 4th. The school officially closed on that date although the administrative offices were in operation for some weeks afterwards to that time, being still operating on March 1, 1919, at the time this report was concluded.

After receiving notice that the school was to close, the staff was reduced to permit an orderly maintenance of instruction until January. By February 1st the staff - staff, with the exception of the 17 Army Instructors was reduced to the administration, but was discharged.

[illegible]

When it was definitely decided that the school was to close, an inventory board was appointed from the members of the staff, whose duty it was to make a complete inventory of all equipment used in the school whether temporarily or permanently or belonging to the University. This report was prepared and has been of much assistance to the clerks preparing the final inventory for which bids were solicited by the University in order to dispose of the property used by the school. At the time this report was being concluded bids for the surplus buildings had been received and accepted by the University and these buildings were being removed. Government property was roughly being stripped and it is to be hoped that the Quartermaster would get it packed and shipped before eligible orders.

[illegible] DURING OF THE ARMISTICE.

Prior to the signing of the armistice, the school had been notified to be prepared to receive additional students in size from 50 to 100 cadets and inasmuch as the capacity of the school was raised at 1200 it was apparently the plan of the War Department to send squadrons of 100 men through the winter. The school had the machine of an organizationally strong staff, including in the various departments the well equipped and sufficient equipment to meet the case of a large school.